

A vertical dotted line runs along the left edge of the page.

# **Approved Metal Bank Sheet Pile Repair Contract Submittals**

# CREAMER ENVIRONMENTAL, INC.

## CONTRACTORS & CONSULTANTS

215 Union Street Hackensack, New Jersey 07601-6846

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

ron International Corporation

ustom House Street

on, MA 02110

DATE: 2/22/16

JOB NO.: 16-0463

ATTENTION: Nicholas Steenhaut

RE: Metal Bank NPL Site

### SENDING YOU



Attached



Under separate cover via \_\_\_\_\_ the following items:

Shop Drawings



Prints



Plans



Samples



Specifications

Copy of letter



Change order



DATE	PAGES	DESCRIPTION
9/2016	1	Submittal #2 Certificate of Insurance

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or Acceptance	<input type="checkbox"/> Approved as submitted
or your use	<input type="checkbox"/> Approved as noted
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SIGNED:

*Meghan Murphy*

Meghan Murphy  
Project Coordinator



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
02/19/2016

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER 1-908-566-1010

Construction Risk Partners, LLC

Campus View Plaza  
1250 Route 28, Suite 201  
Branchburg, NJ 08876

INSURED  
Creamer Environmental, Inc.

12 Old Bridge Road

Cedar Grove, NJ 07009

CONTACT

NAME:

PHONE

(A/C, No, Ext):

E-MAIL

ADDRESS:

FAX

(A/C, No):

INSURER(S) AFFORDING COVERAGE

NAIC #

INSURER A: STARR SURPLUS LINES INS CO

13604

INSURER B: STARR IND & LIAB CO

38318

INSURER C: FEDERAL INS CO

20281

INSURER D: LIBERTY SURPLUS INS CORP

10725

INSURER E:

INSURER F:

## COVERAGES

CERTIFICATE NUMBER: 46106477

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR TR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> Contractor's Pollution <input checked="" type="checkbox"/> Professional GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			1000065235142	11/20/15	11/20/16	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 25,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
B	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input checked="" type="checkbox"/> Comp. \$1,000 <input checked="" type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS Coll. \$1,000			SISIPCA08220415	11/20/15	11/20/16	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$			1000336252142	11/20/15	11/20/16	EACH OCCURRENCE \$ 20,000,000 AGGREGATE \$ 20,000,000 \$
C	<input checked="" type="checkbox"/> WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A	0044727221	11/20/15	11/20/16	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
D	<input checked="" type="checkbox"/> Excess Liability			UMEDE 103723-115	11/20/15	11/20/16	Occur/Aggregate 8,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Cottman Avenue PRP Group C/O Dan J. Jordanger, ESQ, Hunton & Williams LLP, name EPA, the Group, its members, their Affiliates, and their respective directors, officers and employees, and their technical consultants (ENVIRON, A Consultants LLC) are an additional insured for the coverages set forth in Section 16:1 as required by written contract.

## CERTIFICATE HOLDER

Cottman Avenue PRP Group C/O  
Dan J. Jordanger, ESQ  
Hunton & Williams LLP  
51 East Byrd Street  
Riverfront Plaza, East Tower  
Richmond, VA 23219

USA

## CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE



**CREAMER ENVIRONMENTAL, INC.**

CONTRACTORS &amp; CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

**LETTER OF TRANSMITTAL****ron International Corporation****ustom House Street****on, MA 02110****DATE: 4/13/16****JOB NO.: 16-0463****ATTENTION: Nicholas Steenhaut****RE: Metal Bank NPL Site****SENDING YOU**

Attached



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Samples



Specifications

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DATE	PAGES	DESCRIPTION
4/13/2016	2	Submittal #3.3 Sequence of Work and Construction Schedule

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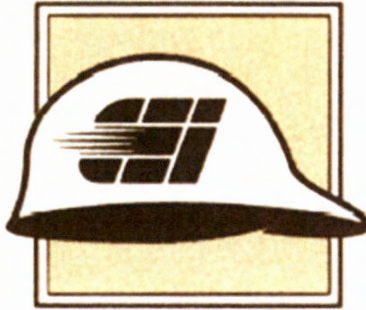


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review &amp; comment

**SIGNED:***Meghan Murphy***Meghan Murphy****Project Coordinator**





# CREAMER ENVIRONMENTAL, INC.

REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site**

### **Philadelphia, PA**

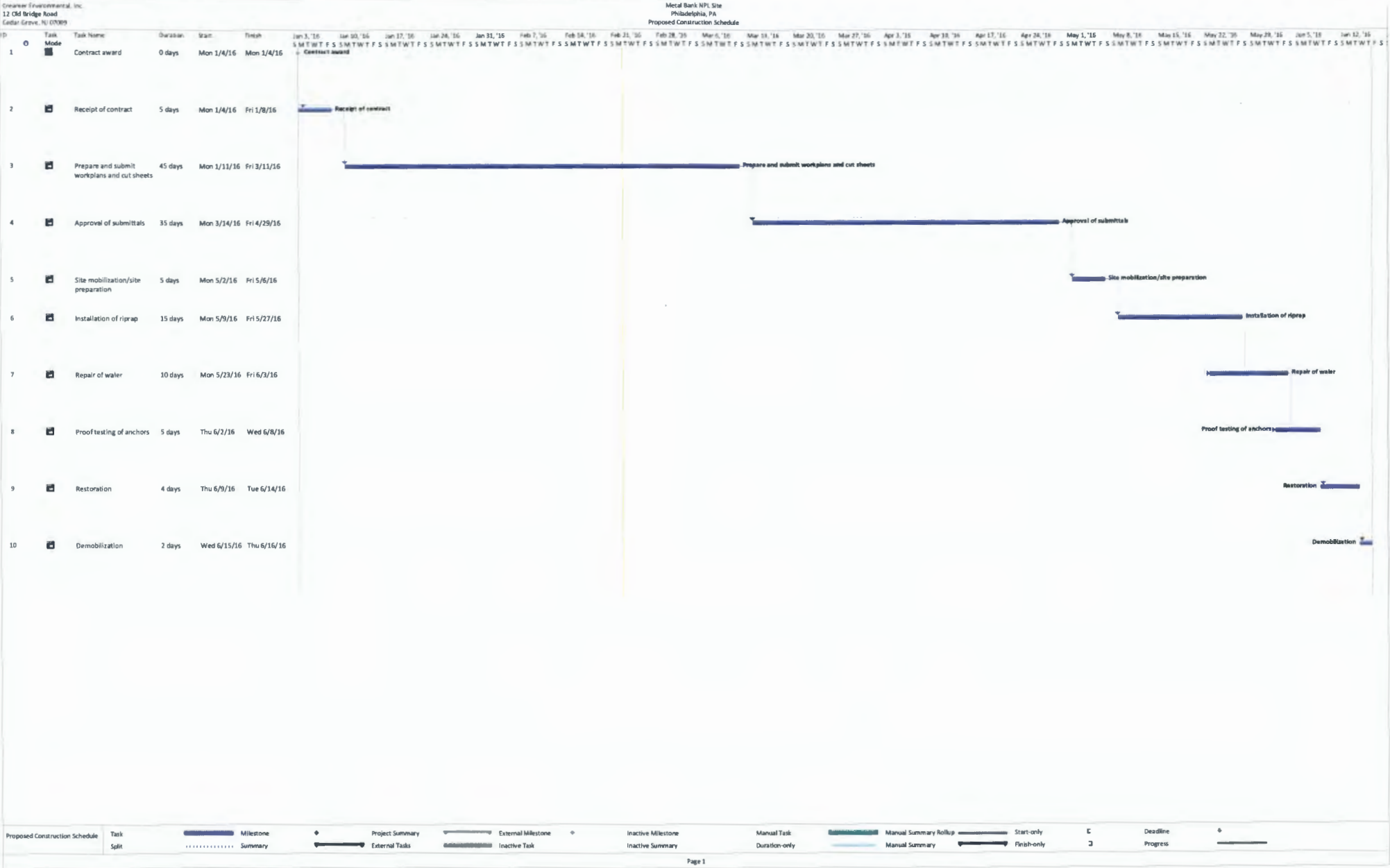
## **Sequence of Work and Construction Schedule**

Creamer Environmental, Inc. (CEI) will mobilize to the site following the approval of the required submittals and all work will be performed in accordance with the respective plan(s). The site set up will consist of installation of an office/crew trailer to run the project from. The trailer will be powered by a portable generator. Cell phones will be used for communication. The fence along the length of wall to receive the rip rap will be removed and replaced at the completion of the work. During this period a temporary fence will be installed behind the sheeting for fall protection and to maintain security. The vegetation will be mowed in the work area to make it possible to traverse the work area. As a part of the site mobilization, CEI will perform a bathymetric survey prior to the rip rap installation to document the existing conditions. Following the survey, a turbidity curtain will be installed around the active work area prior to the start of work. During the placement of stone turbidity will be monitored multiple times daily and during the monitoring the curtain will be inspected for any maintenance that may be required.

The rip rap will be delivered to the site in dump trucks and stockpiled periodically such that a crane with clamshell and/or a long reach excavator will be able to pick it up and place it along the shoreline as required. The rip rap installation will be performed following an approved Turbidity Control Plan that is in-place at the site. The clamshell bucket or excavator bucket will be lowered to within 1' to 2' of the bottom to carefully place the first layer of R6 stone. Each subsequent layer of stone will be placed via a bucket lowered to within 2' to 3' feet of the previous layer in order to minimize turbidity. The initial location for the rip rap placement will be the waler repair area within Zone 2 so work can begin. CEI will install a stone berm to approximately Elevation 5.5 in the waler repair area to create a work platform for welding. The work platform will be left in place at the completion of the project. The rip rap installation will continue during the waler repair work in Zone 1. Once Zone 1 is completed the rip rap installation will be continued in the remaining portion of Zone 2 and in Zone 3. Periodically the rip rap will be surveyed to make sure that it is being installed to the proper elevation. Upon completion a bathymetric survey will be performed to verify the as-built conditions.

Once the waler repair is completed, CEI will conduct tie-rod testing as per the specifications. Following the proof testing, CEI will begin to demobilize the site. The temporary fence along the bulkhead will be removed and the existing fence will be reinstalled. The disturbed vegetated areas will be re-graded as needed and the areas reseeded.

Please see the attached Construction Schedule for a timeline of the above activities.



**CREAMER ENVIRONMENTAL, INC.****CONTRACTORS & CONSULTANTS**

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

**LETTER OF TRANSMITTAL****Environ International Corporation****20 Custom House Street****Boston, MA 02110****DATE: 3/2/16****JOB NO.: 16-0463****ATTENTION: Nicholas Steenhaut****RE: Metal Bank NPL Site****WE ARE SENDING YOU**☐ Shop Drawings☐ Copy of letter☒ Attached☐ Prints☐ Change order

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☐ Plans☐ Samples☐ Specifications

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1	3/2/2016	84	Submittal #4 Health and Safety Plan

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**HEALTH & SAFETY PLAN**  
for  
**Metal Bank NPL Site**  
**7301 Milnor St., Philadelphia, PA 19136**

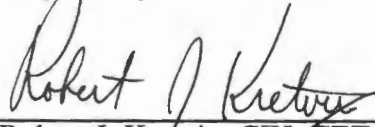
Prepared by



for  
**Creamer Environmental Inc.**  
**16-0463**

**Issued: March 2, 2016**

Prepared by:

  
Robert J. Kretvix, CIH, CET  
Principal Consultant

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PENDIX II - FORMS

PENDIX III - (M)SDS & CHEMICAL INFORMATION



## HASP ACKNOWLEDGMENT

The following individuals acknowledge that they have read and understand this Health & Safety Plan:

[illegible]

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# INTRODUCTION

## 1.1 SCOPE AND APPLICATION OF THE PLAN

The purpose of this site-specific Health and Safety Plan (HASP) is to define the health & safety requirements and designate protocols to be followed by Creamer Environmental Inc. (CEI) during activities at the Metal Bank NPL Site project located at 7301 Milnor St., Philadelphia, PA 19136 for the protection of site workers, the general public and the environment. Applicability extends to contractors, subcontractors, and visitors that enter the CEI site while construction activities are occurring. For the purposes of this HASP, the term "site" shall be used to identify construction areas associated in and around the CEI work area.

All CEI personnel, on-site contractors and subcontractors included (hereafter referred to as "project personnel"), shall be informed of the site emergency response procedures and any potential health or safety hazards of the operations. This HASP summarizes those hazards, and defines protective measures planned for the site.

This plan must be reviewed by all project personnel, and an agreement to comply with the requirements contained herein, must be signed by all project personnel and visitors who may enter the work areas prior to commencement of work.

During development of this plan, consideration was given to current safety standards as defined by OSHA and NIOSH.

All contractors and visitors at this site are expected to comply with all applicable government safety, environmental, & health regulations, as well as company policies. Worker protection standards include, but are not limited to -

OSHA Hazard Communication (29 CFR 1910.1200)  
OSHA Lockout-Tagout (29 CFR 1910.147)  
OSHA Construction Standards (29 CFR 1926), such as -

- Subpart C General Health & Safety Provisions
- Occupational Noise Exposure (1926.53)
- Subpart F Fire Protection
- Subpart G Signs, Signals and Barricades
- Subpart I Hand & Power Tools
- Subpart J Welding & Cutting
- Subpart M Fall Protection
- Subpart P Trenching, Shoring and Excavation
- Subpart Q Concrete & Masonry Construction
- Subpart T Demolition
- Subpart X Ladders

Should there be any apparent conflict between this plan and any of the above mentioned sources, procedures should err on the side of safety, and the more stringent provisions followed until a proper evaluation can be made to determine the appropriate course of action.

---

## **1.2 APPLICABILITY TO VISITORS & INSPECTORS**

All visitors and inspectors entering the CEI-controlled work areas at the site will be required to read and sign a written compliance statement stating that they are knowledgeable and will comply with all provisions of this HASP. In addition, visitors will be expected to comply with all OSHA requirements, training (Section 4), and respiratory protection (Section 6). All project personnel, visitors, and inspectors will provide and care for their own protective equipment or arrange to acquire PPE from the health and safety staff.

In the event that any project personnel, visitor, or inspector does not adhere to the provisions of the HASP, he/she will be requested to leave the work site or area. All non-conformance incidents will be recorded in the site log by the site Health & Safety Officer.



# IDENTIFICATION OF KEY SITE PERSONNEL & MANAGEMENT

## 2.1 KEY SITE PERSONNEL CONTACTS

Title	Person or Organization	Contact Phone Numbers
<b>Prime Site Contractor</b> - Creamer Environmental Inc., 12 Old Bridge Road Cedar Grove, NJ 07009; phone: (201) 968-3300		
Project Manager (PM)	Gary Kowalski	office: 201-215-9628 cell: 201-376-7153
Site Supervisor / Superintendent (SS)	John Castellani	office: 201-215-9626 cell: 201-522-5089
<b>Health &amp; Safety</b>		
Site Health & Safety Officer (HSO)	John Castellani	office: 201-215-9626 cell: 201-522-5089
Certified Industrial Hygienist (CIH)	Robert J. Kretvix, CIH, CET	office: 908-237-9348 x101 cell: 908-397-7506
<b>Project Owner &amp; Other Representatives</b>		
Environ, Senior Manager	Nicholas Steenhaut	office: 617-946-6109
RA Consultants, On-Site Rep		office: cell:

## 2.2 ROLES & RESPONSIBILITIES

Creamer Environmental Inc. (CEI) has primary responsibility for supplying personnel and equipment for operations under a Site Supervisor/Superintendent's (SS) oversight and direction. CEI will also have an oversight function to ensure that the health and safety of all its project personnel is a primary concern.

The Site Supervisor / Superintendent has overall responsibility for ensuring that all aspects for the project are implemented and progress is constant per project specifications. As the representative for the prime contractor, the Site Supervisor / Superintendent has the responsibility to follow this HASP and implement the steps necessary to protect the health and safety of all workers on site, including all its subcontractors. The Site Supervisor / Superintendent will establish and ensure compliance with site control areas and procedures. The Site Supervisor / Superintendent has responsibility for all field activities and enforces safe work practices by all crew members. The Site Supervisor / Superintendent has ultimate responsibility for the safety of any visitors who enter the site. The Site Supervisor / Superintendent maintains communication with the project manager, site owner representatives and other client representative(s) as required.

The Health and Safety team is composed of the site Health & Safety Officer (HSO) and a Certified Industrial Hygienist (CIH). The HSO will generally be responsible for day-to-day implementation of the HASP. The HSO will make recommendations to protect the health and safety of all individuals on site. However, the HSO will confer with the CIH on matters of significant importance, such as recommendations for air monitoring and upgrading or downgrading PPE being used.

---

The Health and Safety team in general is responsible for the recognition, evaluation and control of potential chemical, physical and biological hazards that may exist at the site during the scope of the project covered by this HASP. As part of these responsibilities, the Health and Safety team is responsible for day to day implementation of health and safety activities. The activities include but are not limited to the following:

- daily implementation of this HASP
- recordkeeping related to worker/visitor qualifications, and training
- implementation of air and thermal stress monitoring, including evaluation of the need for additional or modifications to the air monitoring program
- selection, use and modifications to personal protective equipment
- addressing questions from workers, project management and regulatory agencies related to health and safety matters at the site.

# SITE HISTORY, DESCRIPTION AND HAZARDS ANALYSIS

## 3.1 PROJECT WORK DESCRIPTION

The site set up will consist of installation of an office/crew trailer to run the project from. The fence along the length of wall to receive the riprap will be removed and replaced at the completion of the work. During this period a temporary fence will be installed behind the sheeting for fall protection and to maintain security. The vegetation will be mowed in the work area to make it possible to traverse the work area.

The riprap will be delivered to the site in dump trucks and stockpiled periodically such that a crane with clamshell and/or a long reach excavator will be able pick it up and place it along the shoreline as required. The riprap installation will continue during the waler repair work in zones 1 and 3.

The waler repair in zone 2 requires the removal of the existing waler (double channel waler) to the limits shown on the plans and installation of a new pair of channels. New channels will be welded into place.

The welding will damage the coating in the area of the weld, and the exposed surfaces will be cleaned and recoated. The exposed areas where the coating has been removed or damaged will be cleaned and coated using field touch up kits that are compatible with the coating on the existing sheeting.

Site restoration will consist of reseeding disturbed vegetated areas and replacement of the chainlink fence along the sheeting line.

## 3.2 CHEMICAL, PHYSICAL & SAFETY HAZARDS

### 3.2.1 Primary Site Contaminants of Concern

Non-Volatiles in Soil (Possible Dust Exposure Concern)	Volatiles from Soil	Volatiles from Groundwater
polychlorinated biphenyls (PCB)	none identified	none identified

The site is a capped/contained National Priority List (NPL) / Superfund site. The known major contaminant at the site are polychlorinated biphenyls (PCBs), although soil and/or groundwater levels of PCBs are not available. This project is not expected to impact PCB contamination at the site nor expose workers to excessive PCB contamination.

Additionally, as with any construction site, hazardous materials can be expected to be present in various everyday forms. Some common types may include:

- Carbon monoxide from vehicle and generator exhaust
- Fuel and Lubricants (e.g., gasoline, diesel fuel, hydraulic oil)



- 
- Cleaning Agents (e.g., detergents, respirator sanitizers, hand cleaners)
  - Miscellaneous Chemicals (e.g., marking paint, bulk office supplies)

International Safety Cards (ISC) and/or (Material) Safety Data Sheets ((M)SDS), which describe chemical hazards for each contaminant of concern, are attached for all site contaminants in Appendix III. (M)SDSs are required for all hazardous materials brought on site pursuant to 29 CFR 1910.1200, including miscellaneous construction chemicals. The HSO will maintain a central file, accessible to all workers, which contains all (M)SDS and/or ISCs for any hazardous materials on the site.

### **3.2.2 Physical & Safety Hazards**

Construction sites may present numerous safety hazards such as:

- Excavations, holes and ditches
- Precariously positioned objects, such as boards and tools, that may fall
- Sharp objects, such as sharp metal on sheetpiling, nails, and broken glass
- Slippery surfaces
- Uneven terrain
- Dangers related to working near heavy equipment such as backhoes, cranes, dump trucks and other material handling equipment, e.g., vehicular traffic
- Biological hazards - ticks, mosquitos, animal bites (e.g., snakes, rats), poison ivy/plants

As such, workers must be aware of these hazards and exercise caution at all times. All unsafe conditions must be reported immediately to the HSO. While it is important to identify and be aware of potential physical hazards and the means by which to reduce the risks from the same, a detailed discussion of these is an insurmountable task. Although a task by task analysis of potential hazards is included in the sections below, the recognition, evaluation, and control of site activities associated with the potential hazards is best accomplished by the development, use, and implementation of standard operating procedures and guidelines, as well as ongoing consultation of applicable standards and regulations. Any such procedures or guidelines are attached in Appendix I.

### **3.3 TASK BY TASK HAZARD ANALYSIS**

The evaluation of potential health and safety hazards related to this project is based upon the knowledge of site background and anticipated risks posed by the specific operations covered by this HASP, and does not apply to any areas not specifically described.

The scope of this project is limited to the major project phases or tasks below:

- (1) Site Mobilization, Setup, & Clearing
- (2) Installation of Rip Rap
- (3) Repair of Waler
- (4) Proof Testing of Anchors
- (5) Site Restoration

The subsections that follow below describes each task and operation in terms of the specific hazards associated with it, and any protective measures to be implemented in order to reduce or eliminate those hazards. In addition, hazards and protective measurements associated with all phases of the project or general work tasks are also discussed. All noted protective measures will be implemented when appropriate throughout the duration of the project.

Situation or Equipment	Potential Hazards	Prevention Measure(s)
<b>General Hazards</b> - Certain hazards potentially exist throughout virtually all phases of the project. These preventative measures are designed to minimize or eliminate the risk the manifestation of these hazards.		
Use of heavy tools, bending and lifting activities.	Back strain	<ul style="list-style-type: none"> <li>Workers will be instructed and are expected to use proper lifting techniques.</li> <li>More than one employee will be used for tasks involving large, heavy or awkward equipment.</li> <li>Sufficient rest breaks will be taken by employees to prevent excessive fatigue.</li> </ul>
Obstacles on work surfaces; mounting/dismounting vehicles; slippery surfaces; uneven terrain; working at elevations or around rip rap.	Slips, trips and falls	<ul style="list-style-type: none"> <li>Good housekeeping will be implemented -work areas will be kept clean and uncluttered to a reasonable degree.</li> <li>Walkways will be maintained free of obstructions and accumulated water.</li> <li>Wiring, plumbing and hoses, etc., will be kept untangled and secured.</li> <li>Walkways or fixed ladders will be kept clear of equipment, debris and other objects.</li> <li>Be alert and observe terrain while walking to minimize slips and falls.</li> </ul>
Falling or rolling stones, heavy objects and equipment; sharp objects on walking surfaces.	Foot injuries - crushed or broken toes, punctures and abrasions on soles of feet.	<ul style="list-style-type: none"> <li>Safety shoes with steel toes and slip-resistant soles will be used for all work tasks.</li> </ul>
Frayed, cracked or broken electrical cords; water in contact with electrical circuits and equipment.	Electrical hazards (shock, electrocution, burns)	<ul style="list-style-type: none"> <li>Lockout/tagout procedures will be used to prevent the start-up or release of energy from electrical, mechanical, hydraulic or pneumatic equipment.</li> <li>GFCI electrical outlets will be used for all outdoor work and/or indoor work wherever water is/may be present.</li> <li>All defective tools will be tagged and removed from service immediately.</li> </ul>
Elevated equipment and work platforms.	Falling hazards; falling objects.	<ul style="list-style-type: none"> <li>Fall protection to prevent personal injuries due to falls will be used when employees work in areas where fall hazards cannot be eliminated by reasonable means due to the location or nature of the work area. Fall protection is required at a height of 6 feet or greater.</li> <li>OSHA-required overhead protection will be provided on heavy equipment which</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
		<p>will not obscure the vision of the operator.</p> <ul style="list-style-type: none"> <li>▶ Visible barriers will be placed around all openings.</li> </ul>
Working with flammable liquids and compressed gases (e.g., acetylene); possible chemical contaminants present at the site.	Fire hazards - burns, damage to equipment, explosion.	<ul style="list-style-type: none"> <li>▶ Combustible and flammable liquids will be stored in OSHA-approved containers. Protected storage areas (e.g., flammable liquid cabinet) will be provided for bulk storage when necessary.</li> <li>▶ Compressed gases will be stored upright and secured to immovable objects when not in use.</li> <li>▶ Gases used for welding will be stored off the welding cart at least 20' apart or protected by a non-combustible barrier at least 5' in height.</li> </ul>
Operation of heavy equipment, generators, drilling operations and power tools.	High noise levels.	<ul style="list-style-type: none"> <li>▶ Noise monitoring will be performed when deemed necessary by the HSO.</li> <li>▶ Hearing protection may be required in some operations as determined by the HSO, such as working on or near heavy equipment.</li> </ul>
Severe weather (e.g., lightning, heavy winds)	Electrocution - struck by lightning. Damage to equipment and facilities.	<ul style="list-style-type: none"> <li>▶ Workers will stop work and proceed to a safe area if/when severe weather approaches.</li> <li>▶ Seek shelter away from trees and other structures that may conduct electricity.</li> <li>▶ Secure temporary structures and equipment in high winds.</li> <li>▶ Workers may return to work upon authorization of the HSO at least 15 minutes after the last lightning is observed or thunder is heard.</li> </ul>
Vehicular Traffic	Struck by vehicle or equipment	<ul style="list-style-type: none"> <li>▶ All workers exposed to vehicular or equipment traffic will wear high visibility traffic warning vests.</li> <li>▶ All equipment will be equipped with operating backup alarms.</li> <li>▶ Appropriate signage will be used for on-coming traffic.</li> </ul>



Situation or Equipment	Potential Hazards	Prevention Measure(s)
Personnel and equipment working on boats or otherwise located in close proximity to bodies of water.	Drowning	<ul style="list-style-type: none"> <li>▶ Workers working on the berms or within 6 feet of water will wear U.S. Coast Guard approved life jackets or buoyant vests.</li> <li>▶ Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. The distance between ring buoys shall not exceed 200 feet.</li> <li>▶ At least one lifesaving skiff will be positioned near the water where work is occurring.</li> </ul>
Improper storage and housekeeping	Potential for slips, trips and falls, as well as fires.	<ul style="list-style-type: none"> <li>▶ The work site will be maintained to a reasonable degree of cleanliness, free of recognized fire hazards. Materials will be stored in their proper containers. Wastes will be disposed in the proper receptacles.</li> <li>▶ Trash, litter, scrap and sawdust or shavings will not be allowed to accumulate. Work areas will be kept clean to prevent to accumulation of dust and scrap. Cleaning will not be accomplished using compressed air to blow dust out of equipment.</li> <li>▶ Means of exiting the site will be kept free of obstructions. Hazardous materials and flammables will not be stored near emergency exits so as to create a greater hazard during emergency evacuations.</li> <li>▶ Hazardous materials, such as flammable solvents, fuels, paints and adhesives, will be stored only in designated areas when not in use. Containers will be kept tightly closed with lids attached when not in use. Waste containers with funnels will be closed except when dispensing into those containers.</li> <li>▶ Paint, paint thinner, alcohol, naphtha, thinner and gasoline should be used only for their intended purposes. Flammable liquids of any kind must be kept in approved safety containers.</li> </ul>
<b>Site Mobilization &amp; Demobilization</b> - The Support area will be cleared of obstacles, vegetation and debris to the greatest extent practical in order to perform the job safely. Site will be restored after work is completed.		
Operation of heavy equipment	Lacerations, punctures or bruises from pinch points between equipment or objects in motion; accidents with moving vehicles.	<ul style="list-style-type: none"> <li>▶ Guards must be maintained and kept in place on all equipment as appropriate. Never operate equipment with guards removed.</li> <li>▶ Employees exposed to vehicle traffic will wear warning vests.</li> <li>▶ When workers are working within close proximity or loading into the bucket of</li> </ul>



Situation or Equipment	Potential Hazards	Prevention Measure(s)
		heavy equipment, the controls for the equipment must be locked out.
Cranes, hoists, backhoes and other elevated equipment	Accidental loss of load and overhead hazards; falling objects	<ul style="list-style-type: none"> <li>▶ Rigging and hoisting of the temporary structure shall be done in accordance with OSHA 1926.753 and Subpart CC, as applicable.</li> <li>▶ The swing radius of equipment will be barricaded at all times. Workers will not be permitted to stand or work under suspended loads or the swing radius of cranes.</li> <li>▶ A qualified rigger or Competent Person shall inspect rigging apparatus before use. This equipment includes but is not limited to control mechanisms, safety devices, hydraulic lines, hooks and latches and tire inflation. Damaged or defective equipment will be removed from service and replaced or repaired immediately.</li> <li>▶ Ensure that the throat hook closures are in place and fully closed.</li> <li>▶ Hoisting will be done only on level surfaces.</li> <li>▶ Only a qualified signal person will give signals to the operator.</li> <li>▶ Prior to lifting a load, the qualified signal person must verify that the areas is clear of personnel, or all others in the vicinity are aware of a load being lowered or lifted. Such personnel will be moved to a safe position away from the load.</li> <li>▶ No personnel are permitted to be transported on balls or hooks.</li> </ul>
	Electric hazards - overhead utilities	<ul style="list-style-type: none"> <li>▶ Both the equipment operator and qualified signal person will be continuously aware of overhead lines.</li> <li>▶ When working near overhead power lines, the boom and cables of equipment should be kept at least twenty (20) feet away from all electric wires, regardless of their voltage.</li> <li>▶ In transit and with no load and boom lowered if any part of the equipment while traveling will get closer than 20 feet to the power line, the employer must ensure that a dedicated spotter who is in continuous contact with the driver/operator is used.</li> <li>▶ Any overhead wire should be considered an energized line until either the person who owns the line, or the electric utility authorities indicate that it is not energized, and it is tagged and marked as</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
		such.
	Lifting and winching operations - Cuts or amputations from pinch or nip points; snapping cables or slings while moving equipment.	<ul style="list-style-type: none"> <li>Winches, cables, slings and equipment will be inspected by the competent person prior to each shift.</li> </ul>
Generator connection	Connection to powered equipment, electrocution	<ul style="list-style-type: none"> <li>Only qualified electricians will make electrical connections to equipment. All electrical conductors and equipment shall be approved. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to workers.</li> <li>Generators will be turned off and disconnected or locked out when electrical connections are made. Lockout-Tagout procedures shall be used when applicable.</li> <li>Powered equipment shall be verified as electrically safe when making repairs or modifications.</li> </ul>
	High noise due to generator operation.	<ul style="list-style-type: none"> <li>Noise monitoring will be performed when deemed necessary by the HSO.</li> <li>Hearing protection may be required when working in close proximity to generators, such as checking oil levels during generator operation.</li> </ul>
<b>Installation of Rip Rap</b>		
Working with heavy equipment near water's edge.	Unstable surfaces for heavy equipment; accidental tipping of crane or backhoe.	<ul style="list-style-type: none"> <li>Spotters or signalmen will be used to control vehicle movement and watch for pedestrians or other vehicles.</li> <li>Qualified/competent heavy equipment operator will inspect and verify the condition of the surface and maximum loads prior to attempting a lift. Hoisting will be done only on level surfaces.</li> <li>Only a qualified signal person will give signals to the operator.</li> <li>Prior to lifting a load, the qualified signal person must verify that the areas is clear of personnel, or all others in the vicinity are aware of a load being lowered or lifted. Such personnel will be moved to a safe position away from the load.</li> </ul>
Operation of heavy equipment, generators, backhoes, cranes and power tools.	High noise levels.	<ul style="list-style-type: none"> <li>Noise monitoring will be performed when deemed necessary by the HSO.</li> <li>Hearing protection may be required in some operations as determined by the HSO, such as working on or near heavy equipment.</li> </ul>
	Traffic hazards	<ul style="list-style-type: none"> <li>Heavy equipment has the right of way.</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
		<p>Eye contact is to be maintained with the operator.</p> <ul style="list-style-type: none"> <li>▶ All heavy equipment and vehicles equipment will be equipped with backup alarms.</li> <li>▶ Traffic warning vests will be worn by all workers in close proximity to the work.</li> <li>▶ Spotters or signalmen will be used to control vehicle movement and watch for pedestrians or other vehicles.</li> </ul>
Cranes, hoists, backhoes and other elevated equipment	Accidental loss of load and overhead hazards; falling objects	<ul style="list-style-type: none"> <li>▶ Rigging and hoisting of the temporary structure shall be done in accordance with OSHA 1926.753 and Subpart CC, as applicable.</li> <li>▶ The swing radius of equipment will be barricaded at all times. Workers will not be permitted to stand or work under suspended loads or the swing radius of cranes.</li> <li>▶ A qualified rigger or Competent Person shall inspect rigging apparatus before use. This equipment includes but is not limited to control mechanisms, safety devices, hydraulic lines, hooks and latches and tire inflation. Damaged or defective equipment will be removed from service and replaced or repaired immediately.</li> <li>▶ Ensure that the throat hook closures are in place and fully closed.</li> <li>▶ Hoisting will be done only on level surfaces.</li> <li>▶ Only a qualified signal person will give signals to the operator.</li> <li>▶ Prior to lifting a load, the qualified signal person must verify that the areas is clear of personnel, or all others in the vicinity are aware of a load being lowered or lifted. Such personnel will be moved to a safe position away from the load.</li> <li>▶ No personnel are permitted to be transported on balls or hooks.</li> </ul>
	Electric hazards - overhead utilities	<ul style="list-style-type: none"> <li>▶ Both the equipment operator and qualified signal person will be continuously aware of overhead lines.</li> <li>▶ When working near overhead power lines, the boom and cables of equipment should be kept at least twenty (20) feet away from all electric wires, regardless of their voltage.</li> <li>▶ In transit and with no load and boom lowered if any part of the equipment while traveling will get closer than 20 feet to the power line, the employer must</li> </ul>



Situation or Equipment	Potential Hazards	Prevention Measure(s)
		<p>ensure that a dedicated spotter who is in continuous contact with the driver/operator is used.</p> <ul style="list-style-type: none"> <li>Any overhead wire should be considered an energized line until either the person who owns the line, or the electric utility authorities indicate that it is not energized, and it is tagged and marked as such.</li> </ul>
	Lifting and winching operations - Cuts or amputations from pinch or nip points; snapping cables or slings while moving equipment.	<ul style="list-style-type: none"> <li>Winches, cables, slings and equipment will be inspected by the competent person prior to each shift.</li> </ul>
Obstacles on work surfaces (e.g., pipes, wires, hoses); mounting/dismounting vehicles; slippery surfaces; uneven terrain; working at elevations.	Slips, trips and falls	<ul style="list-style-type: none"> <li>Good housekeeping will be implemented -work areas will be kept clean and uncluttered to a reasonable degree.</li> <li>Walkways will be maintained free of obstructions and accumulated water.</li> <li>Wiring, plumbing and hoses, etc., will be kept untangled and secured.</li> <li>Walkways or fixed ladders will be kept clear of equipment, debris and other objects.</li> <li>Be alert and observe terrain while walking to minimize slips and falls.</li> </ul>
<b>Repair of Waler</b>		
Hot Work - cutting and welding of sheet piling & tie backs	Fire hazards, burns, UV radiation, electrical	<ul style="list-style-type: none"> <li>A fire extinguisher will be present during all hot work activities</li> <li>The HSO will approve of all hot work operations in advance of the start of work and issue a Hot Work Permit.</li> <li>A backup person acting in the role of firewatch will be in the vicinity of the work throughout the hot work to ensure nearby combustibles materials have not been ignited. The firewatch will remain present for at least 30 minutes after the termination of hot work.</li> <li>Workers doing hot work will don the appropriate PPE, such as shaded welding helmet, gloves, flame resistant (FR) protective clothing against sparks and burns, and respiratory protection as needed.</li> <li>Compressed welding gases will be used and stored according to OSHA requirements 29 CFR 1926.350. Gas cylinders will be stored with all valves closed, upright and secured from falling. Valve protection caps will be in place while in storage.</li> <li>At the termination of daily activities, oxygen and acetylene cylinders will be</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
		<p>removed from welding carts and separated by at least 20 ft or a block wall at least 5 ft high unless the cart has a fire barrier to separate the cylinders.</p>
Welding, cutting and brazing of metals.	<p>Inhalation of fumes; contact with hot material; cuts from sharp metal edges; damage to retina of the eye from ultraviolet light; fire hazards caused by welding/cutting sparks and embers.</p>	<ul style="list-style-type: none"> <li>▶ Eye or face protection is required during torch cutting operations. Face protection for torch cutting operations should be worn "as needed" based on evaluation by the HSO.</li> <li>▶ Welding requires both shaded eye protection and face protection due to constant UV exposure.</li> <li>▶ Gloves will be used during handling of sharp objects. Workers handling metal sheeting will don appropriate cut-resistant hand protection.</li> <li>▶ Cutting, welding and brazing will be done under a Hot Work Permit issued by the HSO.</li> <li>▶ If significant accumulations of combustible materials are present, including outdoor brush and debris, they will be protected from sparks using a non-combustible physical barrier or clearance of at least 35 feet.</li> <li>▶ A fire watch, if required as per the Hot Work Permit, will be designated to watch the area during the entire period of hot work and for at least 30 minutes after work is completed if combustible materials are present.</li> <li>▶ An ABC fire extinguisher will be positioned nearby to extinguish fires caused by the hot work. Both the fire watch and person performing hot work will be trained in fire extinguisher use.</li> <li>▶ Workers performing sheetpile cutting or welding will don proper work clothes, and tinted welding faceshield. P100 respirators may be required for extended periods of welding.</li> <li>▶ Oxygen and acetylene cylinders should be stored upright and securely fastened at all times. Oxygen and acetylene cylinders must be stored separately at a distance of at least 20 feet. When oxygen and acetylene cylinders are being used on a cart that has a fire barrier that separates the oxygen from acetylene, storage of cylinders is permissible.</li> <li>▶ Drums, containers and structures which were used for flammable materials or have the potential to contain flammable residual vapors/gases will be removed, filled with water and/or thoroughly cleaned and ventilated to prevent ignition</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
		of those vapors. No cutting/welding will occur directly on containers used for flammable liquids.
Elevated equipment and work platforms.	Falling hazards; falling objects.	<ul style="list-style-type: none"> <li>▶ Fall protection to prevent personal injuries due to falls will be used when employees work in areas where fall hazards cannot be eliminated by reasonable means due to the location or nature of the work area. Fall protection is required at a height of 6 feet or greater.</li> <li>▶ OSHA-required overhead protection will be provided on heavy equipment which will not obscure the vision of the operator.</li> <li>▶ Visible barriers will be placed around all openings.</li> </ul>
Ladder use	Injury or damage from falls off ladders or falling objects.	<ul style="list-style-type: none"> <li>▶ Ladders will be selected and used according to OSHA 29 CFR 1926 Subpart X.</li> <li>▶ Ladders or ramps will be set up such that the maximum distance from any worker is 25 ft.</li> <li>▶ All ladders will be inspected for defects and proper function by a competent person prior to use. Damaged or defective ladders will be taken out of use and marked out of service until repaired.</li> <li>▶ Whenever possible, extension ladders will be extended 1 ft out from the vertical surface for every 4 ft of ladder rise. Ladders will extend 3 ft above the top landing, and shall be tied off to a stable structural item.</li> <li>▶ Workers will climb ladders with 2 hands. Equipment should be raised and lowered separately using ropes or baskets.</li> <li>▶ Workers should not extend out beyond the side rails of the ladder (i.e., the "Belt Buckle Rule").</li> </ul>



Situation or Equipment	Potential Hazards	Prevention Measure(s)
Cranes, hoists, backhoes and other elevated equipment	Accidental loss of load and overhead hazards; falling objects	<ul style="list-style-type: none"> <li>▶ Rigging and hoisting of the temporary structure shall be done in accordance with OSHA 1926.753 and Subpart CC, as applicable.</li> <li>▶ The swing radius of equipment will be barricaded at all times. Workers will not be permitted to stand or work under suspended loads or the swing radius of cranes.</li> <li>▶ A qualified rigger or Competent Person shall inspect rigging apparatus before use. This equipment includes but is not limited to control mechanisms, safety devices, hydraulic lines, hooks and latches and tire inflation. Damaged or defective equipment will be removed from service and replaced or repaired immediately.</li> <li>▶ Ensure that the throat hook closures are in place and fully closed.</li> <li>▶ Hoisting will be done only on level surfaces.</li> <li>▶ Only a qualified signal person will give signals to the operator.</li> <li>▶ Prior to lifting a load, the qualified signal person must verify that the areas is clear of personnel, or all others in the vicinity are aware of a load being lowered or lifted. Such personnel will be moved to a safe position away from the load.</li> <li>▶ No personnel are permitted to be transported on balls or hooks.</li> </ul>
	Lifting and winching operations - Cuts or amputations from pinch or nip points; snapping cables or slings while moving equipment.	<ul style="list-style-type: none"> <li>▶ Winches, cables, slings and equipment will be inspected by the competent person prior to each shift.</li> </ul>
Cleaning of steel to remove existing (epoxy) coating.	<p>Inhalation of potentially hazardous air contaminants from coating materials.</p> <p>Fire from use of methods to burn or clean with solvents.</p>	<ul style="list-style-type: none"> <li>▶ Coatings will be removed by mechanical means as much as possible prior to the use of heat or other chemical solvents. Material will be scraped from the surface using a stiff metal or plastic scraper.</li> <li>▶ A heat gun may be used to soften the epoxy (200°F), although only small areas of heating will be done at relatively low temperatures - i.e., no burning. Ensure adequate ventilation when heating epoxy.</li> <li>▶ Sand the surface to remove the remaining material and/or wipe light residue with alcohol or other safe solvent - keep away from heat, spark and open flame.</li> </ul>

Situation or Equipment	Potential Hazards	Prevention Measure(s)
<b>Proof Testing of Anchors</b>		
Cranes, hoists, backhoes and other elevated equipment	Accidental loss of load and overhead hazards; falling objects	<ul style="list-style-type: none"> <li>▶ Rigging and hoisting of the temporary structure shall be done in accordance with OSHA 1926.753 and Subpart CC, as applicable.</li> <li>▶ The swing radius of equipment will be barricaded at all times. Workers will not be permitted to stand or work under suspended loads or the swing radius of cranes.</li> <li>▶ A qualified rigger or Competent Person shall inspect rigging apparatus before use. This equipment includes but is not limited to control mechanisms, safety devices, hydraulic lines, hooks and latches and tire inflation. Damaged or defective equipment will be removed from service and replaced or repaired immediately.</li> <li>▶ Ensure that the throat hook closures are in place and fully closed.</li> <li>▶ Hoisting will be done only on level surfaces.</li> <li>▶ Only a qualified signal person will give signals to the operator.</li> <li>▶ Prior to lifting a load, the qualified signal person must verify that the areas is clear of personnel, or all others in the vicinity are aware of a load being lowered or lifted. Such personnel will be moved to a safe position away from the load.</li> <li>▶ No personnel are permitted to be transported on balls or hooks.</li> </ul>
	Lifting and winching operations - Cuts or amputations from pinch or nip points; snapping cables or slings while moving equipment.	<ul style="list-style-type: none"> <li>▶ Winches, cables, slings and equipment will be inspected by the competent person prior to each shift.</li> </ul>
Anchor testing	Abrupt loss of pressure or failure of tie rod resulting in impact injury.	<ul style="list-style-type: none"> <li>▶ Workers not involved in the testing process will remain at least 50' from anchor tests. Cones or caution tape will be used to delineate test areas.</li> <li>▶ The test operator will wear PPE consisting of hard hat, safety glasses under faceshield and high visibility vest. The operator will position him/herself a safe distance away.</li> <li>▶ The operator will continuously monitor test pressures so that they do not exceed test or equipment limits.</li> </ul>

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## 4 TRAINING REQUIREMENTS

### 4.1 HAZARDOUS WASTE OPERATIONS

#### 4.1.1 Initial / Pre-Assignment Training

All workers at the site will be trained according to the OSHA 10-hr Construction Safety standards or equivalent, at a minimum.

#### 4.1.2 Supervisor

Consistent with OSHA 29 CFR 1910.120 paragraph (e)(8), individuals designated as Supervisors require an additional 8 hours of training. The term "Supervisor" shall include but not limited to the Project Manager, Project Engineers, Site Supervisor / Superintendent, and Health & Safety Officer. The HSO will maintain on-site documentation of 8-hr Supervisor training certificates for the above individuals.

#### 4.1.3 Specialized Annual Training

In addition to the above, each worker will verify that refresher training has been received within the required time-frames for the following OSHA topics, as applicable to the work they are doing.

- bloodborne pathogens (1910.1030) - required annually when potentially exposed to human waste or bodily fluids, including first aid and rescue personnel
- occupational noise exposure (1910.95) - required annually for persons working near heavy equipment for extended periods
- lockout-tagout (1910.147) - for persons servicing or maintaining equipment where shutdown is necessary to prevent exposure to hazardous energy sources
- welding, cutting and brazing (1910.252), oxygen-fuel gas welding & cutting (1910.253), and/or arc welding (1910.254) - for persons performing welding, cutting or brazing of metal

### 4.2 COMPETENT PERSON

Prior to operating heavy equipment, such as cranes and rigging equipment, a "competent person" must assess site conditions to verify safe conditions and determine actions in order to ensure worker safety. Per 29 CFR 1926.650, a *Competent Person* is an individual who either through training or experience is "capable of identifying existing and predictable hazards" associated with the excavation activities. Additionally, he or she will have authorization to take prompt corrective action to eliminate any hazards, including but not limited to shutting down operations.

A competent person will select, oversee and maintain chains, slings and hoisting equipment. Equipment inspections shall be documented at least monthly or more often as deemed necessary by the competent person for the selected pieces of equipment.



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### **4.3 INITIAL HEALTH & SAFETY BRIEFING**

The HSO shall conduct a site specific health and safety briefing for all employees of CEI, its subcontractor(s), visitors, and governmental officials (e.g., city and state "inspectors"), who will perform work on site. The Health and Safety Briefing shall include, at a minimum, the following:

- The contents of this site specific Health and Safety Plan
- Names of personnel and alternates responsible for site health and safety
- Project roles & responsibilities
- OSHA training requirements
- Work practices by which the employee can use to minimize risks of safety and health regard
- Health and safety emergency procedures
- Reporting of fires, emergencies and first aid incidents
- Emergency and contingency procedures

### **4.4 TAILGATE SAFETY MEETINGS**

Site pre-entry Field Safety Meetings, also called "Tailgate Safety Meetings", will be presented to all site personnel each morning just prior to the onset of work activities. It will be the responsibility of the HSO and/or Site Supervisor / Superintendent to conduct these meetings. All Tailgate Safety Meetings are mandatory for all project personnel. At the conclusion of the meeting, each individual will be required to sign the Tailgate Safety Meeting Attendance Log or an equivalent.

The HSO and Site Supervisor / Superintendent will determine the topics each morning based on activities to be conducted that day and any incidents or items identified during previous days. These topics shall include, but are not limited to, heat stress, PPE requirements, chemical hazards, physical hazards, emergency procedures, and injury or incident analysis, and any other special considerations.

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## 5 PERSONAL PROTECTIVE EQUIPMENT

This section describes the general requirements of the EPA designated Levels of Protection (A-D), and the specific levels of protection required for each task at the site. The following subsections define the specific personal protective equipment requirements and the individual skin protection materials required for this particular site. A hazard assessment in accordance with 29 CFR 1910.132(d) was performed in order to determine exact requirements.

### 5.1 INITIAL LEVELS OF PERSONAL PROTECTION

Job Task	Initial Level of Protection
Welding, burning, cutting or heating of epoxy coatings.	Level C with welding helmet and respiratory protection.
Heavy equipment operators	Level D
All other work tasks	Level D

#### 5.1.1 Reassessment of Personal Protection

The level of protection provided by PPE selection shall be upgraded or downgraded based upon a change in site conditions or findings of investigation. The reevaluation process will be on-going during the project. The HSO will have discretion to modify ensembles as his/her observations dictate with consultation of the CIH.

When a significant change occurs in the process or tasks performed, the hazards and PPE will be reassessed. Some indicators of the need for reassessment are:

- Commencement of a new work phase, such as the start of work that begins on a different portion of the site.
- Change in job tasks during a work phase.
- Change of season/weather or ambient temperature.
- When temperature extremes or individual medical considerations limit the effectiveness of PPE.
- Contaminants other than those previously identified are encountered.
- Capacity of personnel to work in PPE

Before the workers actually begin work in their PPE ensembles, the anticipated duration of the work mission will be established. This will be determined at the daily tailgate safety briefing. Situations which may limit mission length, include:

- Weather conditions
- Job tasks
- PPE permeation rates
- Respirator end of service life

### 5.1.2 Anticipated Project PPE Upgrades

In general, workers will utilize level D protection. However, workers doing extended periods of welding, cutting, brazing or heating of metals will wear Level C to guard against inhalation of hazardous metals and decomposition products of epoxy coatings.

Based upon the previous sampling information supplied, no work in levels B or A is anticipated.

## 5.2 DESCRIPTION OF LEVELS OF PROTECTION

The specific levels of protection and necessary components for each have been divided into four categories in conformance with U.S. EPA guidelines according to the degrees of protection afforded:

- Level A:** Should be worn when the maximum level of respiratory, skin, and eye protection is needed. Level A requires the use of a SCBA with a fully-encapsulated gas-tight, vapor-tight chemical protective suit.
- Level B:** Should be worn when the highest level of respiratory protection, but a lesser level of skin protection is needed.
- Level C:** Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.
- Level D:** Level D provides minimal protection against chemical hazards. It is normally worn only as a work uniform and not in any area with significant respiratory or skin contact hazards. Level D Modified should be worn when respiratory protection is not warranted but dermal protection is necessary.

Modifications of these levels are permitted and routinely employed during site work activities to maximize efficiency. Likewise the type of chemical protective ensemble will depend upon contaminants, concentration and extent of contact.

The Level of Protection selected is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere as well as its toxicity.
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work executed.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure and contaminant matrix.
- Understanding of chemical, physical and biological hazards that may be encountered.

PPE Type	Level D	Level C
Eye	Safety glasses with side shields or goggles	Shaded welding helmet



PPE Type	Level D	Level C
Gloves	Cotton or leather work gloves, as needed for work	Outer cotton or leather welding gloves
Clothing	Work clothing High visibility reflective traffic warning vest	Work clothing leather welding jacket or apron.
Respiratory	None	Air-purifying respirator with NIOSH-approved cartridges under or built into welding helmet.
Footwear	Safety work boots	Safety work boots
Head Protection	Hard hat	Hard hat
Other (as needed)	Hearing protection Fall protection	Hearing protection Fall protection

The HSO shall ensure that each worker who is exposed to the hazards of flames (hot work) or electric arcs should not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury that would be sustained by the employee. Flame retardant/resistant clothing shall be designed and maintained in accordance with ASTM 1506 or NFPA 1975 requirements. Clothing made from the following types of fabrics, either alone or in blends, are prohibited: acetate, nylon, polyester, rayon.

### 5.3 STANDARD OPERATING PROCEDURES FOR PERSONAL PROTECTIVE CLOTHING

#### 5.3.1 Inspection

Proper inspection of PPE features several sequences of inspection depending upon specific articles of PPE and its frequency of use. The different levels of inspection are as follows:

- ▶ Inspection and operational testing of equipment received from the factory or distributor.
- ▶ Inspection of equipment as it is issued to workers.
- ▶ Inspection before each use
- ▶ Inspection after use or training and prior to maintenance.
- ▶ Periodic inspection of stored equipment.
- ▶ Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The following inspection list for PPE will be in use and should be implemented prior to immediate use and conducted by the user. This ensures that the specific device or article has been checked out by the user and that the user is familiar with its use.

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## 5.4 HEARING CONSERVATION

Workers exposed to high noise levels are required to wear hearing protection. High noise levels are considered sound levels over 90 dBA on an 8-hour time-weighted average basis. These noise levels shall be factored down for work shifts greater than 8 hours. Hearing protection is advised whenever it is necessary to raise your voice to be heard above the noise source.

In general, the following workers are required to wear hearing protection at all times:

- ▶ generator operation or testing while in operation
- ▶ working around heavy equipment - e.g., front end loaders, dump trucks, generators, cranes, bulldozers, water trucks, vac trucks, drill rigs

The HSO may upgrade or downgrade hearing protection requirements based on the taking of actual noise measurements, and considering of the proximity of workers to the noise source(s).

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## **6 RESPIRATORY PROTECTION**

When workers are required to wear respirators they will be trained in compliance with 29 CFR 1910.134, on their proper use, care, limitations, maintenance, fitting, etc. of respirators. All employers, including subcontractor employers, will provide their own respiratory protection and filter cartridges.

### **6.1 AIR PURIFYING RESPIRATORS (APR)**

If used, air-purifying respirators shall consist of those pieces of respiratory protection specified under or as part of a welding helmet. Typically this will consist of a half cartridge respirator fitted with the appropriate filter cartridge.

#### **6.1.1 Cartridge Change-out Frequency**

P-100 cartridges or filters used for welding will be replaced at least every 30 days.

#### **6.1.2 Daily Cleaning Procedure**

Each user of a respirator is responsible for cleaning, maintaining and inspecting his/her own respiratory protective devices. The steps to be followed for cleaning and disinfecting daily are as follows:

1. **Respirator Disassembly** - Respirators are taken to a clean location where the filters, cartridges or canisters are removed. For a thorough cleaning, inhalation and exhalation valves, speaking diaphragm and any hoses are to be removed.
2. **Cleaning** - In most instances the appropriate cleaning and disinfecting solution provided by the manufacturer is used and is dissolved in warm water in an appropriate tub. Using gloves, the respirator is placed in the tub and swirled for a few moments. A soft brush may be used to facilitate cleaning.
3. **Rinsing** - The cleaned and disinfected respirators are rinsed thoroughly in water to remove all traces of detergent and disinfectant.
4. **Drying** - The respirators may be allowed to air dry in the room on a clean surface. They may also be hung upside down, but care must be taken not to damage or distort the face pieces.
5. **Re-assembly and Inspection** - The clean, dry respirator face-piece should be re-assembled and inspected in an area separate from the disassembly area to avoid contamination. Special emphasis should be given to inspecting the respirators for detergent or soap residue left by inadequate rinsing. This problem appears most often under the seat of the exhalation valve and can cause valve leakage or sticking.

#### **6.1.3 Inspection & Checkout**

1. Each respirator user will visually inspect the entire APR unit for any obvious damages, defects or deteriorated rubber.
2. Make sure that the face-piece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.



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3. Inspect lens for damage and proper seal in face-piece.
  4. Exhalation Valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve (which could cause leakage).
  5. Inhalation Valves (two) - screw off cartridges/canisters and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.
  6. Make sure a protective cover lens is attached to the lens.
  7. Make sure the speaking diaphragm retainer ring is hand tight.
  8. Make sure that you have the correct cartridge.
  9. Don respirator and perform negative and positive pressure test.

#### Storage of Air Purifying Respirators

OSHA requires that respirators be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.

Storage of respirators should be in a clean, secure area which minimizes the chance for contamination or unsanitary conditions. APR's will be stored in a secure area.

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## 7 MEDICAL SURVEILLANCE REQUIREMENTS

Medical monitoring programs are designed to track the medical condition of all personnel on a regular basis in addition to identifying medical conditions that may put site personnel at increased risk. All personnel that have the potential to wear respiratory protection will provide proof that they are *fit-for-duty* and cleared to wear the required respiratory protection at a minimum.

### 7.1 BASELINE & PRE-ASSIGNMENT MEDICAL MONITORING

The NIOSH/OSHA/USCG/EPA's *Occupational Safety and Health Guidance Manual* recommends the minimum medical monitoring requirements for work at the site, as follows:

Component	Minimum Medical Monitoring	Frequency
Respiratory Protection usage	<ul style="list-style-type: none"><li>►Completion of OSHA Respiratory Protection Questionnaire and review by a physician or licensed health care professional (PLHCP)</li><li>►Physical Examination and Pulmonary Function testing (as deemed necessary by the PLHCP).</li><li>►Respirator fit test</li></ul>	Fit Testing at least annually.

The physical will provide written clearance by a qualified physician that personnel are *fit-for-duty* and *able to wear respiratory protection*, as appropriate. Only those employees determined by a physical within the past 12 months as *fit-for-duty* and *able to wear respiratory protection* will be allowed to wear respirators.

### 7.2 ACCIDENT & ILLNESS REPORTS

CEI will notify the site owner or representative of all on-site "significant incidents", including the time of occurrence, in writing within one business day. "Significant Incidents" include fatalities, OSHA Recordable injuries, unexpected release of any product or chemical, interruption of any utility service, fire, explosion or property damage, motor vehicle accident, or any other incident that may appear in news media. Verbal notifications should be provided to the site owner/operator as soon as the situation is under control and immediate safety concerns have been addressed.

### 7.3 HEAT STRESS EVALUATION

Temperatures inside protective equipment can be as much as 25% over external ambient temperatures with humidity near 100%. Excessive temperatures and loss of body fluids can result in a range of health conditions ranging from heat rash, cramps, exhaustion, heat stroke and possibly death.

Prior to the start of work, the HSO will assess all work site occupations and tasks in order to determine the

level of work demand and document this assessment. The HSO will make this assessment using the chart below as a guide.

The general steps to perform heat stress evaluations are given below. Each step is described in more detail in subsequent subsections:

- 1) Determine the level of work demand effort for each job task (Section 7.3).
- 2) When temperatures are or may be over 80°F during the day, periodically calculate the WBGT “heat index” throughout the day at regular intervals and compare to action levels for each work demand category (Section 7.3.1).
- 3) Perform periodic heat stress monitoring on workers using either tympanic measurements and/or pulse rate measurements when the WBGT exceeds Heat Stress Action Levels (Section 7.3.2). Compare to heat stress monitoring results to medical guidelines.
- 4) Institute heat stress management controls when monitoring parameters exceed guidelines for core body temperature or pulse rate (Section 7.3.4).

### Reengineering Criteria for Work Demand Category

Categories	Example Activities	Assigned Trades & Tasks
Resting	<ul style="list-style-type: none"> <li>•Sitting quietly</li> <li>•Sitting with moderate arm movements</li> </ul>	
Light	<ul style="list-style-type: none"> <li>•Sitting with moderate arm and leg movements</li> <li>•Standing with light work at machine or bench while using mostly arms</li> <li>•Using a table saw</li> <li>•Standing with light or moderate work at machine or bench and some walking about</li> </ul>	<ul style="list-style-type: none"> <li>•Laborer - decontaminate trucks &amp; equipment</li> <li>•Laborer - directing trucks</li> <li>•Laborer - setting up fence</li> <li>•Laborer - dust control</li> <li>•Laborer - water treatment</li> <li>•Equipment operators</li> <li>•Burning, welding, cutting</li> <li>•Health &amp; Safety Officer</li> <li>•Project Manager &amp; Site Supervisor / Superintendent</li> <li>•Mechanic - various task</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>•Scrubbing at a standing position</li> <li>•Walking about with moderate lifting or pushing</li> <li>•Walking on a level at 6 Km/hr while carrying 3 Kg weight load</li> </ul>	<ul style="list-style-type: none"> <li>•Laborer - setting up pumps &amp; hoses</li> <li>•Timber lagging installation</li> <li>•Sheet pile installation</li> <li>•Laborer - fence post driving</li> </ul>
Heavy	<ul style="list-style-type: none"> <li>•Carpenter sawing by hand</li> <li>•Shoveling dry sand</li> <li>•Heavy assembly work on a noncontinuous basis</li> <li>•Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)</li> </ul>	<ul style="list-style-type: none"> <li>•Laborer - digging dry soil</li> <li>•Laborer - tree cutting</li> </ul>
Very Heavy	<ul style="list-style-type: none"> <li>•Shoveling wet sand</li> </ul>	<ul style="list-style-type: none"> <li>•Laborer - digging wet soil</li> </ul>



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### 7.3.1 Heat Stress Action Levels

Wet Bulb, Globe Temperature (WBGT) will be monitored and logged at a minimum of three times a day when daily high temperatures are expected to exceed 80°F. Additionally, when the WBGT temperature is expected to exceed this threshold, baseline tympanic temperature levels will be logged for all workers prior to the commencement of work. Finally, above 80°F, shelter or shaded areas should be provided and daily safety briefings should include awareness items for heat stress.

$$\text{WBGT} = 0.7 \cdot \text{WB} + 0.2 \cdot \text{GT} + 0.1 \cdot \text{DB}$$

WB= wet bulb temperature, GT=globe temperature, DB=dry bulb temperature

## Screening Criteria for Heat Stress Exposure

Work Demands	ACTION LEVEL*	ACTION
Light	WBGT $\geq 85$ °F	<ul style="list-style-type: none"> <li>Tympanic Temperatures monitored at least every 2 hours</li> </ul>
Moderate	WBGT $\geq 82$ °F	<ul style="list-style-type: none"> <li>Tympanic Temperatures monitored at least every 1.5 hours</li> </ul>
Heavy	WBGT $\geq 79$ °F	<ul style="list-style-type: none"> <li>Tympanic Temperatures monitored at least every 1 hour</li> </ul>
Very Heavy	WBGT $\geq 77$ °F	<ul style="list-style-type: none"> <li>Tympanic Temperatures monitored at least every ½ hour</li> </ul>
Any work utilizing Level C or B chemical resistant clothing	ambient $\geq 69.8$ °F	<ul style="list-style-type: none"> <li>Tympanic Temperatures monitored at least every 1 hour</li> </ul>

Note: The Action Levels in this table assume the most conservative 100% acclimatized work demand with no rest periods. Consult ACGIH Heat Stress Table (2012 TLV booklet) for other work/rest regimens.

### 7.3.2 Heat Stress Monitoring

Three methods of monitoring for heat stress may normally be used when WBGT temperatures exceed screening criteria action levels for each work demand category: core body temperature, heart rate, or body water loss. For this project, Core Body Temperatures monitored by tympanic (i.e., through the ear canal) temperature measurement will be the primary method. Procedures for heart (pulse) rate heat stress monitoring has been given as an alternative method in the event body temperature measuring equipment is out of service or otherwise unavailable.

At a minimum, the HSO (or his designee) will take tympanic temperature measurements to measure body temperature whenever the heat stress action levels above are exceeded. Baseline body temperatures should be measured at the beginning of the work day and recorded in a log for each worker. Thereafter, body temperatures will be measured as soon as possible after the person has exited the work zone at the frequencies identified in the above table. Body temperatures should not exceed 100.4°F, or 1.5 °F over the baseline measurement. No person should be allowed to return to work until within 0.5 degrees of the baseline measurement.

### 7.3.3 Alternative/Optional Heat Stress Measurement Procedures

The following procedures for pulse/heart rate monitoring shall be used if core body temperature measurement equipment is out of service or otherwise unavailable. Additionally, pulse rates may be monitored if conditions warrant at the discretion of the HSO.

Pulse or heart rate is the best indicator of overall stress being applied to the body. The most widely accepted pulse measurement and evaluation method is known as the “*Age Adjusted Maximum Heart Rate*” (AAMHR). The AAMHR is considered to be the maximum heart rate which an individual can maintain for extended periods without damaging heart muscles. However, this limit may be lower for individuals with pre-existing medical conditions.

$$\text{AAMHR} = 180 - \text{Age}$$

Each individual's pulse rate should be measured at the beginning of the work shift if conditions warrant. This starting pulse rate, the person's age and AAMHR will be recorded on a log sheet. Each person's pulse rate will be re-measured upon exiting the work zone. If the pulse rate exceeds the AAMHR, the individual will be restricted from additional work activities until the pulse rate returns to within 5% of normal and less than 90 beats per minute.

#### Summary of Heat Stress Measurement Guidelines

Vital Sign	Worker Removal Point	Return to Work Point
Body Temperature	> 100.4 °F or >1.5 °F over baseline	≤0.5 °F of normal / baseline
Pulse Rate	>AAMHR or >110 beats per min. at rest	< 90 beats per min. and <105% of baseline

### 7.3.4 Heat Stress Management

WBGT and indicators of heat strain will be monitored per the above tables. When necessary the general controls will be used to control heat stress.

- Workers will be given verbal instructions and reminders during Tailgate Safety Meetings.
- The drinking of water in small volumes (about 1 cup every 20 minutes) throughout the day will be encouraged.
- Worker will be allowed to self-limit their exposures if they detect signs and symptoms of heat strain in themselves or others.
- Individuals taking medications which may put them at greater risk, such as for blood pressure, cardiovascular medication, body temperature regulation, renal or sweat gland functions, and those who abuse or are recovering from alcoholism, will be counseled on



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- the dangers. A healthy lifestyle will be encouraged.
  - Individuals returning to work after an extended absence from hot exposure will be encouraged to consume salty foods.
  - The HSO, in consultation with the CIH, will consider the use of engineering controls (e.g., air movement, erection of shaded shelter, etc.), administrative controls (e.g., adjusted rest periods, personnel rotation, etc.) and modification of PPE as appropriate. Any decisions regarding the use or non-use of specific controls will be documented in the HSO's logbook.

## **7.4 COLD STRESS**

Personnel working in extreme cold, even for a short time, may experience severe injury to the surface of the body (frostbite), or profound generalized cooling (hypothermia). Frostbite usually occurs to parts of the body having high surface-to-volume ratios, such as fingers, toes, ears and nose. Incipient frostbite is characterized by a blanching or whitening of the skin. Superficial frostbite is characterized by skin with a waxy or white appearance that is firm to the touch, but the skin underneath is resilient. Deep frostbite is characterized by cold, pale skin that is solid to the touch.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms include shivering, apathy, listlessness, sleepiness, unconsciousness, freezing of the extremities, and even death.

The extent of frostbite and hypothermia are influenced greatly by wind speed/wind chill and wetness of the skin. Thus the body can cool rapidly when chemical protective equipment is removed and the clothing underneath is soaked with perspiration. Workers experiencing signs of hypothermia should be immediately removed from the environment, placed in a warm location, covered with dry blankets and provided with warm liquids. Wet clothing should be removed and replaced with dry clothing and outerwear.

### **7.4.1 Cold Stress Monitoring**

The HSO will periodically measure air temperature and wind velocity when temperatures fall below 10 °F. Results will be compared to the Work/Warm-Up Schedule found in Section 7.4.2. The appropriate work/rest schedules will be determined by the HSO, in consultation with the Site Supervisor / Superintendent and CIH, based on these measurements. Decisions regarding work/rest schedules will be documented in the HSO's daily logbook.

### **7.4.2 Cold Stress Work/Warmup Schedule for 4-hour Shift**

The following work/warmup schedule will be used when working in cold temperatures for prolonged (i.e., as least 4 hour) periods.

### Work/Warm-up Schedule for 4-hr Shift

Air Temp (°F) Sunny Day	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
	Max Work Period	# of Breaks	Max Work Period	# of Breaks	Max Work Period	# of Breaks	Max Work Period	# of Breaks	Max Work Period	# of Breaks
-15 to -19	normal	1	normal	1	75 min	2	55 min	3	40 min	4
-20 to -24	normal	1	75 min	2	55 min	3	40 min	4	30 min	5
-25 to -29	75 min	2	55 min	3	40 min	4	30 min	5	stop work ↓	
-30 to -34	55 min	3	40 min	4	30 min	5	stop work ↓↓ ↓			
-35 to -39	40 min	4	30 min	5	stop work ↓					
-40 to -44	30 min	5	stop work ↓							
< -45	stop work									

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## **AIR MONITORING PROGRAM**

r monitoring will be conducted on this project because the site is believed to be free of exposure to  
dous chemical contaminants.



## 9 SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program. In addition to the following all personnel are required to sign in and out at the job site office trailer. A log for this purpose will be maintained with entries for date, name of visitor, company, purpose for entry to site, time in, and time out. Whenever visitor or non-project personnel leave the site, they must sign out.

### 9.1 BUDDY SYSTEM

During work activities, implementation of a buddy system is mandatory. A buddy system requires at least two people who work as a team, each looking out for each other, via voice or visual contact.

### 9.2 SITE COMMUNICATIONS

Successful communications between field teams and personnel in the support zone is essential. The following communications systems may be available during activities at the site.

1. Two way radios
2. Intrinsically safe radio (in potential explosive atmospheres)
3. Air horns
4. Hand Signals
5. Cellular phone or hardwired phone for emergencies only.

#### 9.2.1 Air Horn Alerts

Signal	Definition
One long blast	Attention
Two long Blasts	Leave when possible
Three long Blasts	Leave area IMMEDIATELY (EMERGENCY Situation)
Repeated Short Blasts	Send Backup Support

#### 9.2.2 Hand Signals

Signal	Definition
Hands clutching throat	Out of air - Cannot breathe

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Signal	Definition
Hands on top of head	Need Assistance
Thumbs Up	OK
Thumbs Down	No
Arms waving upright	Trouble - Send backup support
Grip partner's wrist	Exit area immediately

### 9.3 SITE SECURITY

All work areas will be secured during off-hours throughout the course of the project. During the course of work all contractor employees and visitors will sign in and out of a logbook maintained by the HSO.

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## **10 EMERGENCY PROCEDURES**

This section describes contingencies and emergency planning procedures to be implemented at the site. This plan should be coordinated with the local authorities disaster and emergency management plans as appropriate. In addition, meetings or other communication with the local hospital, rescue squad, hazardous materials unit and fire department will occur so as to advise the emergency response representatives of the nature and type of contaminants victims may have been exposed to while on site. Directions to the hospital will be posted on site when this HASP is in effect. Emergency procedures will be posted and covered in daily site briefings.

### **10.1 PRE-EMERGENCY PLANNING**

The Site Supervisor / Superintendent will ensure that the appropriate lines of communications have been established with local hospitals, government agencies and other emergency response organizations prior to site activities. During the site briefings held periodically/daily, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes.

### **10.2 EMERGENCY EQUIPMENT & FACILITIES**

The following emergency equipment will be available at all times:

- First aid kit
- Fire extinguishers near areas of welding and torch burning, outside flammable liquid storage areas, and near the entrance to the Exclusion Zone
- Portable eye wash near any areas of chemical use or splashing
- Emergency shower, potable water garden hose, or pressurized sprayer
- Mobile phone and/or two-way radio
- Oil absorbing spill pads and booms

Generally emergency equipment will be stored in the support zone.

### **10.3 PERSONNEL ROLES AND LINES OF AUTHORITY**

The Site Supervisor / Superintendent / HSO has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measure to ensure the safety of site personnel and the public. Possible actions may involve evacuation of adjacent personnel. Additionally, they are responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow up reports completed.

### **10.4 EVACUATION PROCEDURES**

If anyone discovers a fire, chemical spill or release, or other process upset necessitating emergency action, he or she will immediately notify the Site Supervisor / Superintendent or HSO. An immediate decision will be made as to whether to evacuate the site or other actions to be taken. The HSO is



primarily responsible for this decision.

The primary response to any emergency will be to protect the health and safety of employees, contractors and visitors on-site, as well as the community and environment. Steps will be taken to *identify, contain, treat, and properly dispose* of the materials involved as a secondary response. The HSO will maintain on file the North American/DOT 2012 Emergency Response Guidebook information and relevant health and safety data relating to the identified substances on the site.

In the event of an emergency which necessitates an evacuation of the site, the following alarm procedures will be implemented:

#### Alerting System

- On site - Utilize air horns or radios as appropriate. Contact 911, alert office personnel to wait at site entrance to direct emergency response units to emergency
- Outside of the remediation areas - Contact 911

When notified to evacuate, all personnel will be expected to proceed to the closest site exit with their buddy, and mobilize to the predetermined safe distance area associated with the evacuation route. Personnel will remain at that area until the re-entry alarm is sounded or an authorized individual provides further instructions. Air horns will be located in the work area near the supervisor's office.

In general, employees should proceed to a designated meeting location that is upwind and uphill from the site or location of the incident, unless otherwise instructed by supervisory personnel. Wind socks and/or flagging will be employed on-site to indicate the upwind direction to which evacuation should proceed.

### **10.4.1 Emergency Contacts & Notification Systems**

The following tables provide names and telephone numbers for emergency contact personnel and key project contacts. It will be posted in the Site Supervisor / Superintendent's / HSO's office, or on vehicles when no offices are available. In the event of a medical emergency, personnel will take direction from the HSO and notify the appropriate emergency organization. In the event of a fire or spill, the Site Supervisor / Superintendent will immediately notify Environ and ensure that the appropriate local, state, and federal agencies are notified. Prior to posting, the Site Supervisor / Superintendent / HSO shall confirm the appropriate contact names and phone numbers are listed .

## EMERGENCY CONTACT LIST

Organization / Responsibility	Specific Contact or Location	Telephone
<b>Government / Emergency Response Organizations</b>		
Local Rescue Squad / Ambulance		911
Local Police	Philadelphia Police Dept. 8501 State St, Phila, PA 19136	911 or 215-685-8126
Local Fire	Philadelphia County Fire Dept. 5200 Pennypack Rd, Phila, PA 19136	911 or 215-685-8971
Local HazMat / Chemical Spills		911
Hospital - Primary for trauma center	Jeannes Hospital 7600 Central Ave, Phila, PA 19111	215-728-2000
Poison Control Center		800-962-1253
National Response Center		800-424-8802
Centers for Disease Control		404-488-4100
CHEMTREC		800-424-9300
NJ DEP		877-WARNDEP (877-927-6337)
U.S. Coast Guard		800-424-8802
U.S. EPA	2890 Woodbridge Ave. Edison, NJ 08837	732-321-6754
<b>Project Emergency Contacts</b>		
Project Manager	Gary Kowalski	office: 201-215-9628 cell: 201-376-7153
Site Supervisor / Health & Safety Officer	John Castellani	office: 201-215-9626 cell: 201-522-5089
Project CIH	Bob Kretvix	office: 908-237-9348 cell: 908-397-7506
Environ, Senior Manager	Nicholas Steenhaut	617-946-6109

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## **10.5 DIRECTIONS TO HOSPITAL**

A map with directions to the nearest hospital is displayed at the end of this section. The HSO will drive the hospital route before field activities begin to verify that the route is acceptable and unobstructed by other construction activities.

## **10.6 FIRE & EXPLOSION PROCEDURES**

In the event of a fire or explosion, the local Fire Department should be summoned immediately. Upon their arrival, the Site Supervisor / Superintendent or designated alternate will advise the Fire Chief / Incident Commander of the location, nature, and identification of the hazardous materials on-site.

If it is safe to do so; site personnel may:

1. Use fire fighting equipment available on site to control or extinguish the fire; and
2. Remove or isolate flammable or other hazardous materials which may contribute to the fire.

## **10.7 SPILL & LEAK PROCEDURES**

In the event of a spill or leak, that may enter any sanitary sewerage pipeline, storm sewer, surface water, soil or other offsite conveyance, site personnel will:

1. Inform supervisor immediately.
2. Terminate work activities (at the discretion of the HSO).
3. Prevent entry into any waterways using defensive means when safe to do so.
4. Follow site emergency notification and evacuation procedures, when necessary.
5. Locate the source of the spillage and stop the flow if it can be done safely.
6. Begin containment and recovery of the spilled materials if it can be done safely.

If the spill or release is expected to pose significant hazards or is beyond the capabilities of the immediate personnel, then the HSO will be contacted immediately. When contacted, the HSO will obtain and assess the following information:

1. the material spilled or released
2. location of the release or spill
3. an estimate of the quantity released and the rate at which it is being released
4. any injuries involved
5. fire and/or explosion or possibility of these events occurring



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6. the area and materials involved in the location of the fire or explosion

In the event of a chemical spill that is not contained within a dike or bermed area, an area of isolation will be established around the spill. The size of the area will generally be dependent on the size of the spill and the material(s) involved. When any spill occurs, only those persons involved in the oversight or performance of the emergency cleanup operations will be allowed within the designated hazard area. If possible, this area will be roped or otherwise blocked off.

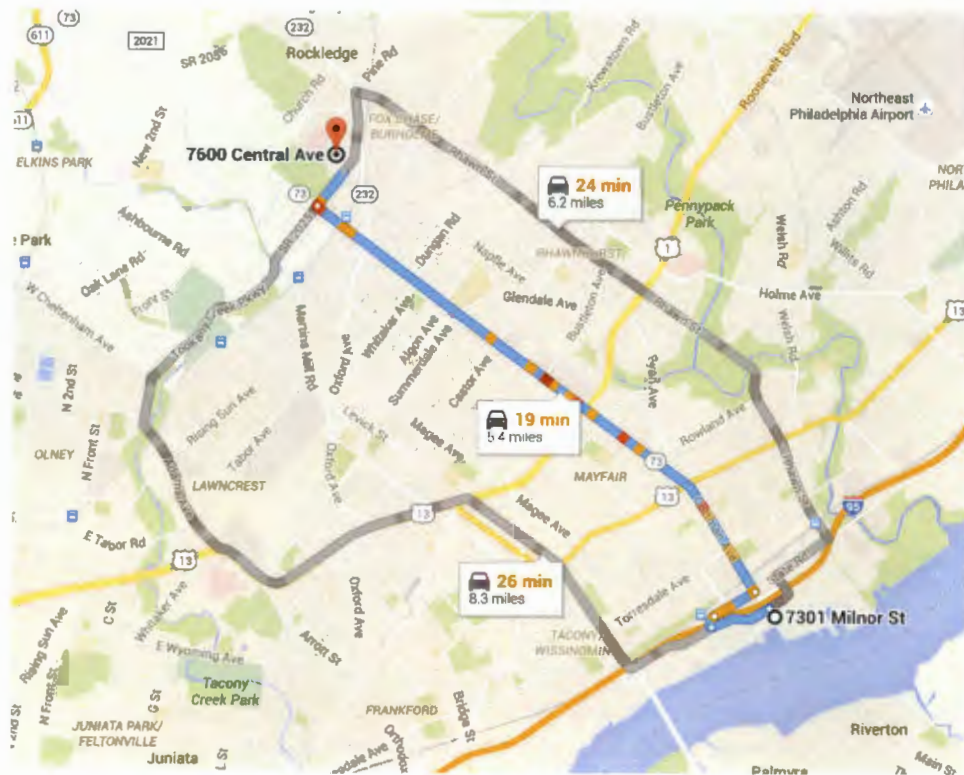
If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The Site Supervisor / Superintendent will inform the proper agencies in the event that this is necessary.

If the control and cleanup of the spill or release is within the capabilities of on-site personnel and the release does not migrate beyond the perimeter of the site the Site Supervisor / Superintendent will determine reporting requirements. Reporting of spills or releases in accordance with other federal, state and local regulations is also the responsibility of the Site Supervisor / Superintendent.

## **10.8 INCIDENT FOLLOW-UP AND CRITIQUE**

Following all emergency response actions and activation of this plan, the Site Supervisor / Superintendent will conduct a debriefing session of all key personnel involved. The response will be critiqued, documented, and response plans revised, if necessary. Corrective actions will be listed where procedures were inadequate or need improvement. Responsible persons will be listed and held accountable for follow-up.

**Directions to Nearest Hospital**  
**Jeannes Hospital**  
**7600 Central Ave**  
**Philadelphia, PA 19111**  
**215-728-2000**



**7301 Milnor St**

Philadelphia PA 9 36

- ↑ Head southwest on Milnor St toward Cottman Ave  
0.4 m
- ➡ Turn right onto New State Rd  
0.1 m
- ↑ Continue onto State Rd  
0.3 m
- ➡ Turn left onto Cottman Ave  
0.42 m
- ➡ Turn right onto Central Ave  
Destination will be on the left  
0.3 m

**7600 Central Ave**

Philadelphia PA 9 11

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## 11 ILLUMINATION & SANITATION

### 11.1 ILLUMINATION

Site operations will cease in time to permit personnel to safely exit the site under well-lighted conditions. Conversely, operations will not begin until lighting is adequate at dawn. If work schedules require work outside of these parameters then portable light systems with sufficient illumination to provide adequate lighting will be provided. (Headlights from vehicles and equipment generally do not provide sufficient illumination to conduct work safely.)

The following are the minimum illumination intensities required by OSHA 1926.56 for various work tasks:

<u>Min. Light Intensity (foot-candles)</u>	<u>Task or Operation</u>
3	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling and field maintenance areas.
5	<ul style="list-style-type: none"><li>• General construction area lighting</li><li>• Indoors: warehouses, corridors, hallways and exits</li><li>• Tunnels, shafts and general underground work areas</li></ul>
10	<ul style="list-style-type: none"><li>• Tunnel and shaft heading during drilling, mucking and scaling when tunnel is manned.</li><li>• General construction plant and shops (batch plants, screening plants, mechanical and electrical rooms, carpenter shops, rigging lofts and active store rooms, mess halls, and indoor toilets and workrooms.</li></ul>
30	First aid stations, infirmaries and offices

### 12.2 SANITATION

Permanent facilities or portable restrooms of sufficient types and numbers to meet the requirements of 29 CFR 1910.120(n) will be provided. Potable water will be provided for workers at the site. Hand and face wash, as well as respirator sanitizing supplies, will be available on site in sufficient quantities for all employees.



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When certain substances regulated by OSHA are present, such as lead, cadmium or asbestos, are present, handwashing, showering and clean change areas for personal clothing shall be provided, as required.

### **12.3 HOUSEKEEPING**

To minimize potential accidents, the site will be maintained in a generally clean condition. Waste personal materials, such as used PPE, paper towels, and respirator cartridges, etc. will be disposed of in waste containers.

The site will be set up so as to be reasonably free from significant safety hazards. Wires and hoses will be positioned so they do not obstruct or present a safety hazard in walkways and evacuation routes. Staged equipment and materials from the work area will be positioned in the support area while not in use until cleaned for removal from the site.

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**APPENDIX I**  
**STANDARD OPERATING PROCEDURES AND POLICIES**

## SECTION 17 - HAZARD COMMUNICATION PROGRAM

### Overview

It is the policy of Creamer Environmental, Inc. that the first consideration of work shall be the protection of the safety and health of all employees. The company has developed this Hazard Communication Program to ensure that all employees receive adequate information about the possible hazards of any hazardous substances used in the company's operations and processes. The following program outlines how we will accomplish this objective.

**Effective December 1, 2013 ALL employees must be trained on the new OSHA Hazard Communication Standard (HCS) called Globally Harmonized System of Classification and Labeling of Chemicals or GHS.**

Essentially, the new GHS program is a simpler and more universal way of identify hazardous materials. Some of the changes will be to pictograms and labels. Also, **Safety Data Sheets(SDS) will now be known as Safety Data Sheet (SDS).**

#### **Major changes to the Hazard Communication Standard:**

- **Hazard classification:** Chemical manufacturers and importers are required to determine the hazards of the chemicals they produce or import. Hazard classification under the new, updated standard provides specific criteria to address health and physical hazards as well as classification of chemical mixtures.
- **Labels:** Chemical manufacturers and importers must provide a label that includes a signal word, pictogram, hazard statement, and precautionary statement for each hazard class and category.
- **Safety Data Sheets:** The new format requires 16 specific sections, ensuring consistency in presentation of important protection information.

Some other modifications to terminology & key words: the term "**hazard determination**" has been changed to "**hazard classification**".

"**Signal word**" is a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on a product label.

The signal words used are "**danger**" and "**warning.**" "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

"**Hazard statement**" means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard - **Example: Fatal if swallowed (Acute Oral Toxicity)**



**“Precautionary statement”** means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling - **Examples: Do not eat, drink, or smoke when using this product & Keep container tightly closed**

The statements assigned to a chemical address the following four areas:

- Prevention
- Response
- Storage
- Disposal

**Key dates:**

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and SDS format.	Employers
June 1, 2015*	Comply with all modified provisions of this final rule, except:	Chemical manufacturers, importers, distributors and employers
December 1, 2015	Distributors may ship products labeled by manufacturers under the old system until December 1, 2015.	
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period	Comply with either 29 CFR 1910.1200 (this final standard), or the current standard, or both.	All chemical manufacturers, importers, distributors and employers

You may start seeing new labels after December 1, 2013.

The dates above allow for distributors & manufacturers to “transition” into the new standard.

is always, planning will be needed to ensure you have reviewed the SDS to address whatever PPE or other controls may be needed as well as First Aid.

**Superintendent's & Project Engineer's ALL have direct & immediate access to ALL SDS so continue to gather that information from them. Call your Super/PE when prior to using a chemical to secure this information.**

### **Hazard Communication Safety Data Sheets**

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDS) (formerly known as Safety Data Sheets or SDS) to communicate the hazards of hazardous chemical products. ***As of June 1, 2015, the HCS will require new SDS to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:***

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information\*

Section 13, Disposal considerations\*


Section 14, Transport information\*

Section 15, Regulatory information\*

Section 16, Other information, includes the date of preparation or last revision.

## **Hazard Communication Standard Labels**

OSHA has updated the requirements for labeling of hazardous chemicals under its Hazard Communication Standard (HCS). As of June 1, 2015, all labels will be required to have pictograms, a signal word, hazard and precautionary statements, the product identifier, and supplier identification. A sample revised HCS label, identifying the required label elements, is shown on the right. Supplemental information can also be provided on the label as needed

SAMPLE LABEL	
<b>PRODUCT IDENTIFIER</b> <b>CODE</b> _____ <b>Product Name</b> _____  <b>SUPPLIER IDENTIFICATION</b> <b>Company Name</b> _____ <b>Street Address</b> _____ <b>City</b> _____ <b>State</b> _____ <b>Postal Code</b> _____ <b>Country</b> _____ <b>Emergency Phone Number</b> _____	<b>HAZARD PICTOGRAMS</b>  <b>SIGNAL WORD</b> <b>Danger</b>  <b>HAZARD STATEMENT</b> <b>Highly flammable liquid and vapor.</b> <b>May cause liver and kidney damage.</b>  <b>SUPPLEMENTAL INFORMATION</b> <b>Directions for use</b> _____ _____ _____ <b>Fill weight:</b> _____ <b>Lot Number</b> _____ <b>Gross weight:</b> _____ <b>Fill Date:</b> _____ <b>Expiration Date</b> _____
<b>PRECAUTIONARY STATEMENTS</b> Keep container tightly closed. Store in cool, well ventilated place that is locked. Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measure against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear Protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.  <b>In Case of Fire:</b> use dry chemical (BC) or Carbon dioxide (CO <sub>2</sub> ) fire extinguisher to extinguish.  <b>First Aid</b> If exposed call Poison Center. If on skin (on hair): Take off immediately any contaminated clothing. Rinse skin with water.	

## **New Labeling System**

- Labels are the immediate source of information on a chemical
- New labels will have more information than current labels
- There may also be additional information (known as supplemental information) on the label that is not required—the required information should be presented together on the label
- Labels on hazardous chemicals will be changing by June 1, 2015



## Hazard Communication Standard Pictogram

As of June 1, 2015, the Hazard Communication Standard (HCS) will require pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

### HCS Pictograms and Hazards

#### Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

#### Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

#### Exclamation Mark



- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

#### Gas Cylinder



- Gases Under Pressure

#### Corrosion



- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals

#### Exploding Bomb



- Explosives
- Self-Reactives
- Organic Peroxides

#### Flame Over Circle



- Oxidizers

#### Environment (Non-Mandatory)

















- Aquatic Toxicity

#### Skull and Crossbones



- Acute Toxicity (fatal or toxic)

## Examples of Transport “Labels”

 <ul style="list-style-type: none"> <li>• Flammable Gas</li> <li>• Flammable Aerosol</li> </ul>	 <ul style="list-style-type: none"> <li>• Flammable solids</li> <li>• Self-Reactive substances and mixtures</li> </ul>	 <ul style="list-style-type: none"> <li>• Pyrophoric solids</li> <li>• Pyrophoric liquids</li> <li>• Self-heating Substances and mixtures</li> </ul>
 <ul style="list-style-type: none"> <li>• Substances and mixtures, which in contact with water, emit flammable gases</li> </ul>	 <ul style="list-style-type: none"> <li>• Oxidizing gases</li> <li>• Oxidizing liquids</li> <li>• Oxidizing solids</li> </ul>	 <ul style="list-style-type: none"> <li>• Self reactive substances and mixtures (type B)</li> <li>• Organic peroxides</li> </ul>
 <ul style="list-style-type: none"> <li>• Explosives (Division 1.4)</li> </ul>	 <ul style="list-style-type: none"> <li>• Explosives (Division 1.5)</li> </ul>	 <ul style="list-style-type: none"> <li>• Explosives (Division 1.6)</li> </ul>
 <ul style="list-style-type: none"> <li>• Gases under pressure</li> </ul>	 <ul style="list-style-type: none"> <li>• Acute toxicity: Oral</li> <li>• Acute toxicity: Skin</li> <li>• Acute toxicity: Inhalation</li> </ul>	 <ul style="list-style-type: none"> <li>• Corrosive to metals</li> <li>• Skin corrosion/irritation</li> </ul>
 <ul style="list-style-type: none"> <li>• Aquatic toxicity (Acute)</li> <li>• Aquatic toxicity (Chronic)</li> </ul>	 <ul style="list-style-type: none"> <li>• Organic Peroxides</li> </ul>	

Our Hazard Communication Program has been developed to assure that our workers have a full understanding of the substances and hazards with which they work, and this program is available for review by all employees, their legal representatives, medical providers and governmental agencies in accordance with the Right to Know standards.

## Program Components

1. In accordance with the OSHA Hazard Communication Standard (29 CFR 1926.59) our Company, shall ensure that:
2. All employees are aware of the existence of the company's Hazard communication Plan and how to obtain a copy of it.
3. Employees will be fully informed of all of the hazardous materials that they are exposed to. This includes, but is not limited to, information given when:
  - a. Employees start a new job
  - b. Employees must perform non-routine tasks
  - c. Employees are exposed to NEW hazards
4. All hazardous materials are labeled
5. All hazardous materials are maintained on the List of Hazardous Chemicals.
6. All hazardous materials have a corresponding Material Safety Data Sheet, and that copies of all SDSs are available to employees.
7. Emergency procedures are to be established, and safety exercises shall be randomly performed.
8. All employees shall be guarded by both protective equipment and personal protective equipment to maintain the highest levels of safety.
9. All employees are to be properly trained and informed of all of the existing work place hazards. This includes not only the job site, but also storage facilities.
10. All employees will receive training for the provisions of the company's Hazard Communication Plan.
11. Any outside contractor(s) inform the job site supervisor of all hazardous materials brought on to the job site. In addition, all outside contractors will be informed of all of the hazardous materials that exist on our job site.
12. All work practices must conform with local, state, and federal governmental agencies. This includes the Community Right to Know Act and all of the requirements of the 1986 Superfund Amendments and Reauthorization Act (SARA).



## **Allocation of Duties**

The Hazard Communication Coordinator is responsible for implementing the program. Specific responsibilities within our Company's Hazard Communication Plan are as follows:

Employee Information & Training: -CONSTRUCTION SITES - Job Site Superintendent  
-SHOP AREAS - Shop Managers

Container Labeling: - CONSTRUCTION SITES - Job Site Superintendent  
- SHOP AREAS - Shop Managers

Safety Data Sheets: - CONSTRUCTION SITES - Job Site Superintendent  
- SHOP AREAS - Shop Managers

Chemical Inventory List(s): - Company Hazard Communication Coordinators

## **Plan Administration and Using This Manual Effectively**

In accordance with the OSHA Hazard Communication Standard (29 CFR 1926.59) all companies must have a written Hazard Communication Plan. This manual has been created to be the company's Written Hazard Communication Plan. This manual alone does not meet the requirements of the OSHA Standard. It is only after the information in this manual is put into everyday practice that there will be compliance with the OSHA Hazard Communication Standard.

To begin the Hazard Communication Program, we have appointed the Safety Superintendent or area Safety Superintendent to be the Company's Hazard Communication Coordinator (CHCC). He will be responsible for implementing all of the necessary programs contained in this manual.

This Hazard Communication program will be monitored to ensure that all facets of the program are carried out and that the program is effective.

Hazard Communication Coordinator shall be responsible for:

1. Establishing a group of people to assist him in implementing the programs. People shall be designated to collect/update Safety Data Sheets and to create/update Chemical Inventory Lists.
2. The CHCC must also place people in charge of setting up certain other programs, such as:
  - a. Creating/Affixing "In-House" Labeling
  - b. Employee Training Programs
  - c. Determining Emergency Procedures
  - d. Approving Emergency Procedures

3. It is very important that the Company Hazard Communications Coordinator understands all of the information that is contained in the manual along with the OSHA Hazard Communication Standard (29 CFR 1926.59).
4. After all of the programs have been initiated, the Hazard Communication Program must be reviewed/accepted by all of our management.
5. All must be trained/informed of the Company's Hazard Communication Program and informed of WHERE they can receive copies of anything and everything contained in this manual.
6. Each job site must set up a Hazard Communication Center where the job site Supervisor keeps all hazardous materials information. This includes everything contained in this manual (Including the List of Hazardous Chemicals, SDS, and Emergency Procedures.)
7. Furthermore, this entire program will be reviewed on an annual basis to insure that everything in the Hazard Communication Program is correct and current.

### **C. EMPLOYEE INFORMATION AND TRAINING**

In accordance with the OSHA Hazard Communication Standard, all employees shall be informed of hazardous materials that exist in their work area. All employees, both current and new, shall be trained for the proper procedures to be utilized when working with hazardous materials. Furthermore, whenever a new hazardous material is introduced into the work area, all employees in that work area will be both informed and trained in the proper procedures for working with the new hazardous material.

1. All employees shall be informed of the Hazard Communication Program.
2. An overview of the requirements of the Hazard Communication Standard, including their rights under this regulation. These rights include:
  - a. to personally receive information regarding hazardous substances to which they may be exposed
  - b. for their physician to receive this information
  - c. against discharge or other discrimination due to exercising these rights
  - d. Access to any medical information pertaining to that employee
3. All employees shall be informed of possible physical and health hazards that exist in their work area.

4. All employees will attend an orientation meeting, initial hire meeting or tailgate safety meeting for information and training on the following items related to hazardous substances:
  - a. To personally receive information regarding hazardous substances to which they may be exposed
  - b. For their physician to receive this information
  - c. Against discharge or other discrimination due to exercising these rights
  - d. Access to any medical information pertaining to that employee information.
  - e. All methods and observations that are used to detect the presence of hazardous materials in the work area including possible leaks, spills or the release of hazardous materials in the work area.
  - f. Emergency/Cleanup Procedures in the event of a leak/spill/release of hazardous materials in the work area.
  - g. All employees shall be trained in the proper use of personal protective equipment and the company policies to protect employees from possible exposure.
  - h. Employees will also be trained to understand hazardous warnings and the definitions of chemical warnings, (i.e., the difference between combustible and flammable).
  - i. The physical and health hazards of the substances in use in their work areas.
  - j. Methods and observation techniques used to determine the presence or release of hazardous substances in the work areas.
  - k. The controls, work practices and personal protective equipment, which are available for protection against possible exposure.
  - l. Emergency and first aid procedures to follow if employees are exposed to hazardous substances.
  - m. How to read labels and Safety Data Sheets to obtain the appropriate hazard information.



5. The location and availability of the written hazard communication program, the list of hazardous substances and Safety Data Sheets will be made available to all employees
6. The program will be available from the Project Manager, Foreman or the Office regarding the use of hazardous substances in their specific work areas.
7. All employees shall have made available to them any medical/air monitoring information regarding their work area. Employees can obtain this information from the job site supervisor or the Company Hazard Communication Coordinator.
8. All employees shall be informed of how to get in touch with the company's Hazard Communication Coordinator for any questions regarding the company's Hazard Communication Program.
9. Any employee can receive a copy of the List of Hazardous Chemicals, Safety Data Sheets, proper handling of hazardous chemicals, Emergency Procedures and/or any piece of information from the Hazard Communication Program.
10. Each and every job site will have copies of the List of Hazardous Chemicals, Safety Data Sheets, proper handling of hazardous chemicals, and the proper procedures to handle a leak/spill/release of hazardous materials.
11. It is most important that all of our employees understand the information given in the initial orientation meetings. Information will be provided in a language understood by the employee. Any questions regarding the orientation meetings should be directed to the Office and the appropriate Project Manager or foreman.
12. When new substances are introduced into the workplace the Project Manager, foreman or manager will review the above items with each affected employee as they relate to the new materials.
13. The Project Manager, foreman or supervisor will be responsible for assuring that all the above information is communicated to new employees who will be working with hazardous substances, prior to starting work.
14. GUIDELINES FOR INSTRUCTIVE SEMINARS:
  - a. Attendance shall be taken.
  - b. The Company Hazard Communications Coordinator shall maintain all records that show exactly which. Employees were trained for which specific task(s), and record that show exactly what information was taught to each employee as an individual.

- c. The Company Hazard Communication Coordinator shall retain all employee quizzes, attendance records, and all other information gathered at the Instructive Seminars.

## **LIST OF HAZARDOUS SUBSTANCES**

1. An inventory list will be maintained of those materials determined to be hazardous under the Hazard Communication Standard that are typically found on our projects. A separate list will be maintained for our Warehouse and Shop.
2. These lists will be updated when new materials and substances are brought into the work place, and will be reviewed periodically to assure that all substances are properly shown.

## **CONTAINER LABELING**

1. No container of hazardous substances will be released for use unless the container is correctly labeled and the label or other form of warning is legible and readable. For non-English speaking employees, provisions will be made to review the English labels and translate the information to the worker in the language he or she is most comfortable.
2. All chemicals in bags, drums, pails, etc., will be checked by the foreman or his designee or Shop/Warehouse Manager to ensure the manufacturer's label is intact, is legible, and has not been damaged in any manner during shipment. Any containers found to have damaged labels will be held until a new label has been attached or the container will be returned to the supplier with a request that a properly labeled container be sent. Creamer Environmental, Inc. employees must not deface or remove labels of incoming hazardous chemical substances.
3. Each and every container must have the manufacturer's labels affixed to it at ALL times.
4. The labels are to include:
  - a. IDENTITY (name) of the chemical.
  - b. NAME & ADDRESS of manufacturer/importer/responsible party.
  - c. ALL HAZARDOUS WARNINGS & REQUIRED PROTECTIVE EQUIPMENT.
5. Hazardous warnings include, but are not limited to, the following descriptions of:
  - a. Physical Hazards, Health Hazards, and lists of Target Organs.

6. Containers that are delivered without proper labels are NOT to be accepted. Containers that do not have proper labels are in violation of the OSHA Hazard Communication Standard are NOT permitted in any work area at any time. Portable containers used solely by the employee who has transferred the substance from a labeled container must be properly labeled in our workplace by company policy.
7. The company must also receive the proper SDS for solid metal materials than give off hazardous materials when worked on.
8. If the chemicals from labeled containers are placed into "in-house" containers, they too must carry the IDENTICAL label that was affixed to the original container.
9. When chemicals are used in "in-house" stationary containers, such as dip tanks, signs/placards can be used instead of affixing labels. NOTE: The signs/placards MUST carry the identical information found on the original container. When the use of labels is ineffective, Signs, placards, batch tickets, and/or other written materials can be used with stationary processing equipment PROVIDED THAT ALL of the information found on the original container label is included.
10. It is the responsibility of the job site supervisor and the Company's Hazard Communication Coordinator to insure that all labels are properly updated whenever a revision is made to a Safety Data Sheets.

## **SAFETY DATA SHEETS(SDS)**

1. Each and every chemical shall have a corresponding SDS on file with the Company Hazard Communication Coordinator (CHCC).
2. Prior to the delivery of any chemical, a SDS must be sent to the CHCC. If this is not possible, a SDS MUST accompany the chemical with delivery to the job site. If the latter is the case, the SDS is to be sent to the CHCC immediately after its arrival on the job site. A copy of all SDS will remain at each job site.
3. The CHCC and Project Management will review all incoming SDS for completeness. If an SDS is missing or obviously incomplete a new SDS will be requested from the manufacturer. OSHA will be notified, in writing, if a complete SDS is not received after 25 working days or if the manufacturer will not supply one. A record will be maintained of all requests for SDS addressed to manufacturers. Any employee or other person legally entitled to a SDS that has requested one which has not been received, will be given a copy of the requesting letter, and then provided a copy of the requested data sheet once it has been received.



4. Copies of SDS for all hazardous substances to which our employees may be exposed are kept in a binder on each Project. An additional copy will be maintained in the Office. These SDS are available to all employees, at all times, upon request. The Company Hazard Communication Coordinator (CHCC) will be responsible for maintaining the master binder and each Project Manager or foreman will maintain their project binder.
5. As these SDS are in English, provisions will be made to translate the content of these data sheets into the language most understood by an employee if the employee requests such translation.
6. New materials will not be introduced into our operations until a SDS has been received.
7. The purchasing personnel will make it an ongoing part of their function to obtain SDS for all new materials when they are first ordered.
8. Chemical(s) delivered to the job site without a SDS will not be accepted. It is our policy NOT to accept any material(s) without the proper SDS. Under no circumstances should there be any materials on the job site/work area/warehouse that do not have a SDS. This INCLUDES materials brought onto the job site by outside contractors/workers. It is the responsibility of the job site supervisor and the CHCC to ensure that all materials brought onto the work site have their own SDS.
9. Copies of ALL SDS are to be sent to each of the job sites that use/store the chemical.
10. Employees can gain access to any and all SDS by requesting them from the job site supervisor and/or CHCC.
11. It is our policy to update/revise all SDS when current information becomes available. It is the responsibility of the CHCC to update/revise SDS and to forward the additions/corrections to every job site that has a SDS on file.

## **CHEMICAL INVENTORY**

It is our policy that all hazardous or potentially hazardous chemicals shall be listed on the Chemical Inventory List.

Chemical Inventory Lists shall be available for each and every job site and shop.

Each supervisor is responsible for maintaining and updating the Chemical Inventory List.

Every time a new chemical is brought into the work area, it is the responsibility of the supervisor/Company Hazard Communication Coordinator to list the materials on the Chemical Inventory List.

The supervisor is also responsible for reporting any adjustments made on the Chemical Inventory List to the Company Hazard Communication Coordinator.

## **OUTSIDE CONTRACTORS OR OTHER WORKERS ON JOB SITE**

1. Everyone on the job site, regardless of who they work for, shall be informed of the hazardous materials that exist on the job site.

2. Outside contractors/workers MUST inform the job site supervisor and the Company Hazard Communication Coordinator of any and all hazardous materials that they bring on to the job site.

3. Employees are to be informed of the hazardous materials that are brought on to the site. Provisions must be made by the job site supervisor and the Company Hazard Communications Coordinator so that employees have the necessary training/protection/information.

4. The job site supervisor and the CHCC must keep records of the hazardous materials that are brought on to the job site by outside contractors/workers in the same fashion that they handle the Company's own Hazard material information. This includes Chemical Inventory Lists, SDS, Emergency Procedures, Labeling, and all other procedures that are used to record hazardous materials that are on the job site. In other words, hazardous materials that are brought on to the job site by Outside contractors/workers must be accounted for with the same measures that our company uses for its own hazardous materials.

5. It is the responsibility of the job site, supervisor, and the CHCC to inform outside contractors of the hazardous materials, the location of Safety Data Sheets, proper handling, emergency procedures, and ALL other pertinent information regarding the hazardous materials on the job site. In other words, Outside contractors/workers are to be informed/trained/protected with the same means that our employees are informed/trained/protected.

6. It is the responsibility of the job site supervisor/ the CHCC to meet with the supervisors of all outside contractors/workers to review the Chemical Inventory Lists, and SDSs to determine what special provisions must be made. This is to determine if outside contractors/workers or our employees need personal protective equipment. This meeting will also ensure that hazardous chemicals do not interact if they are not compatible.

## **NON-ROUTINE WORK TASKS**

Any employee who is assigned a non-routine work task **MUST** be informed of all of the hazardous materials in the work area. It is the responsibility of the job site supervisor to inform the employee of the hazardous material safety procedures for the job, and the correct usage of personal protective equipment that is necessary. The job site supervisor is to insure that the necessary monitoring and sampling has been completed in order to evaluate the hazards of the work area.

Infrequently, employees may be required to perform hazardous non-routine tasks. Prior to starting this work, each involved employee will be given information by his or her Project Manager, foreman or supervisor about hazards to which they may be exposed during such activity.

The control measures will be communicated with employees including special ventilation, respirators, the presence of another employee, and emergency procedures. This includes confined space procedures that are outlined in the Confined Space Entry Program.

An employee who is assigned a non-routine work task has the same right to see the List of Hazardous Chemicals, SDS, and any and all pertinent information as would a routine performer of the same task.

All Lists of Hazardous Chemicals, Safety Data Sheets, Handling Procedures, and necessary Personal Protective Equipment Lists are available on the job site or through the Company Hazard Communications Coordinator.

**NOTE:** Both the job site supervisor and the Company Hazard Communication Coordinator must be notified prior to the initiation of any non-routine work tasks.

## **PERSONAL PROTECTIVE EQUIPMENT DOCUMENTATION**

Documents regarding the proper usage of all personal protective equipment shall be kept on file with both the Company Hazard Communication Coordinator and the supervisors at all work sites. We shall strictly enforce compliance regarding the use of required personal protective equipment.

**NOTE:** Some personal protective equipment, such as respirators, requires a prior medical exam to be performed on the employee before he/she is able to utilize such equipment.

## **EMERGENCY EXPOSURE PROCEDURES**

In the event of an exposure to a hazardous material, the work site supervisor and the Company Hazard Communication Coordinator must be immediately notified so that the appropriate action(s) can be taken. All hazardous materials must have their own SDS



on file at the work site, which will clearly state the direct action(s) that must be taken to remedy the situation.

In the event of a spill/leak of a hazardous material, reference MUST be made to the material's SDS so that appropriate action(s) can be taken. The work site supervisor and the Company Hazard Communication Coordinator must be notified of a spill/leak.

## **POSTING OF INFORMATION**

It is the policy of our company to post information for the employees at the work site. In regards to the Company's Hazard Communication Program, our company will post information on the availability of Safety Data Sheets, Lists of Hazardous Materials, and where to obtain a copy of the written Hazard Communication Program. In addition, this company will post additional information related to keeping the employees informed on the hazards that exist in their work area.

## SECTION 32 - LOCK-OUT/TAG-OUT PROGRAM

On projects which utilize a client's or owner's program, a copy of the program procedures shall be secured by the Project Manager/Superintendent.

### **RESPONSIBILITIES**

The Project Manager/Superintendent has overall responsibility for establishing and ensuring compliance with this procedure.

It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

The lockout/tagout program field operation will be reviewed and inspected periodically by the Safety Superintendent or Area Safety Superintendent to determine the process is effective. The inspection will be documented with the date, equipment use, and the person conducting the inspection.

### **DEFINITIONS**

**Danger Tag:** A numbered tag stating "DANGER" on both sides in white letters on a red, white, and black background with specific instructions to protect personnel working on equipment and/or systems.

**Energy Source:** Any electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, or compressed gas energy stored in springs; and potential energy from suspended objects (gravity) that may injure personnel, cause property damage and/or cause a release of hazardous substance to the environment.

**Isolation:** A physical activity using a device which prevents the transmission or release of energy. Examples of devices used to isolate equipment/systems include, but are not limited to: Restraint blocks, electrical circuit breakers, disconnect switches, removal of fuses, slip gate, slip bind, or use of double valves.

**NOTE:** Where possible, such devices shall provide visible indication of the position of the device (push buttons, selector switches, and other control circuit type devices are not energy isolation devices).

**Locking Device:** A device that utilizes a lock, key and identification number to hold an energy isolation device in the safe position for the purpose of protecting personnel.

**Tag Disposal:** The act of returning all approved and removed tags to the Project Manager, Supervisor, or Engineer, who then destroys the tags to prevent reuse.

## APPLICATION

### A. General

1. A properly established Lock-Out/Tag-Out Program represents a lifesaving control. Compliance with this procedure is mandatory. Questions regarding the Lock-Out/Tag-Out Program should be directed to the Project Manager/Superintendent.
2. Where design permits, a lock shall be applied in support of a "DANGER" tag to ensure the energy source is kept isolated. Whenever major replacement, repair, renovation, or modification of machines or equipment is performed, or new machines or equipment are installed, energy isolation devices shall be designed to accept a locking device.
3. No device shall be operated with tag or lock attached regardless of circumstances.
4. In an emergency, or if the person who placed the tag is not available, the Project Manager/Superintendent shall have the authority to remove the danger tags and locks **ONLY AFTER POSITIVELY DETERMINING THAT THE EQUIPMENT OR SYSTEM IS SAFE FOR OPERATION AND THAT ALL PERSONNEL ARE IN THE CLEAR.**
5. Personnel deviating from these instructions, or unauthorized persons removing danger tags, will be subject to disciplinary action to include their removal from the project.

### B. Implementation

1. Use of Locks and Tags
  - a. Locks and "DANGER" tags shall be used by authorized personnel when the release of energy can cause injury to personnel create property damage, or release a harmful substance to the environment. If locks cannot be used, an alternate method of isolating the system must be implemented. Tags will always be used.
  - b. Only authorized individuals install the lock and tag on the equipment or system requiring the energy source to be controlled. In operations where more than one individual is working on the equipment or system, each individual installs a lock and tag. Each authorized individual will place their name and identification on the tag they use.
  - c. The lock and tag should be affixed in a way to insure that the energy isolating devices is in a safe position, cannot move, will not allow operation and is in the off



position. The tag should be attached at the same point at which the lock fastened. Where a tag cannot be fastened directly to the energy isolating device, the tag shall be located as close as possible to the energy isolating device in a position that will be obvious to anyone attempting to operate the equipment or device.

- d. Before an authorized turns off a machine or equipment, the authorized individual shall have knowledge of the type & magnitude of the energy, the hazards of the energy to be controlled, & the methods or means to control the energy.
- e. The machine or equipment shall be turned off or shutdown using the procedures established by the manufacture for the machine or equipment.
- f. The authorized individual installer verifies that the equipment or system has been properly isolated. Verification is accomplished by operating or testing the equipment or system for energy release. If there is any doubt regarding the isolation of the equipment or system, the Project Manager/Superintendent should be contacted. The use of system schematics, isometrics, etc., should be used when determining isolation points. Critical systems may be parallel feed from a separate source and must also be isolated.
- g. All energy isolating devices that are use control to the machine or equipment shall be physically located & operated in such a manner as to isolate the machine or equipment from the energy source. All potentially hazardous stored or residual energy shall be relieved, disconnected, restrained & otherwise rendered safe. If there is a possibility of reaccumulation of stored energy level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
- h. After a physical check has been conducted of the area to ensure all personnel working on the equipment or system are accounted for, the installer removes the lock and tag for the area/activity under his/her authority.
- i. When machine or equipment must be tested foe operation, the following sets must be followed:
  - a. Clear away tools
  - b. Remove employees
  - c. Remove the locks and tags
  - d. Energize & proceed with testing;
  - e. De-energize & reapply energy isolating device control measures.

- f. Authorized individuals should document this process using the Log Book
- j. The installer returns the lock and tag to the designated area and enters into the log book the date the lock and/or tag were removed.
- k. The individual destroys the tag after the information is logged.

#### i. Requirements for Locks and Tags

1. The Project Manager/Superintendent, numbers each lock (serial numbers on locks can be used) before placing it in use to ensure it can be accounted for. A list of lock numbers is kept by the Project Manager/Superintendent.
2. The key of one lock does not fit any other lock.
3. Each tag shall be numbered and logged in the log book by the Project Manager/Superintendent before being placed in use to ensure accountability.
4. The authorized individual using the tag completes the information contained on the tag, such as:
  - a. Log book location
  - b. Job identification
  - c. Installed by (signature of Project Manager / Superintendent / Foreman)
  - d. Component tagged
  - e. Component position
  - f. Any special instructions of the employees

#### j. Requirements for Log Book

1. A log book is required to account for each tag and lock that is issued.
2. Each time a lock and tag is put in use information is completed in the log book, such as the following.
  - a. Tag number
  - b. Lock number
  - c. Work number
  - d. Craft number
  - e. Location of the tag and/or lock

- f. System or component that was affected
- g. Date and time lock and/or tag was attached
- h. Individual using lock and tag
- i. Date and time lock and/or tag is returned to cabinet.

#### E. Training

1. All affected employees must be trained company lockout/tagout procedures
2. The training must include:
  - a. Recognition of hazardous energy source, type & magnitude of energy available, methods & means necessary for energy isolation & control.
  - b. The purpose & use of the energy control procedure.
  - c. When lockout/tagout systems are used including the limitations of a tag (tags are warning devices & do not provide physical restraint).
  - d. A tag is not to be removed without authorization. The tag is never to be ignored or defeated in any way.
3. Retraining is required when there is a change in job assignments, in machines, a change in the energy control procedures, or a new hazard is introduced.
4. All training and/or retraining must be documented, dated, signed & certified
5. Other employees shall be trained in this procedure.
  - a. On projects utilizing a lock out/tag out program which differs from ours, our employees shall be trained in the applicable program.

#### F. Group Locks and Multiple Groups

1. The Project Manager/Superintendent or designated authorized coordinator has primary responsibility for a set number of employees working under the protection of a group lockout/tagout device.
2. The authorized coordinator must ascertain the exposure of individual group members.
3. Each authorized individual shall attach a personal lockout/tagout device to the group's multi hasp device while he/she is working on the machine or equipment.



Remove of all authorized individuals lockout/tagout device can only be conducted with all affect parties and authorized coordinator's knowledge and permission.

4. During shift change or personnel changes, all lock/out tagout procedures must be coordinated with all affected parties. Documentation of this process should be maintained in the Log Book.
5. Group locks and tags may be utilized when all employees of the group are signatory to the log book when checking out; and when returning the lock/tag

### 3. Outside Personnel, Contractors, Process Safety Management

1. Outside servicing personnel or contractor employees involved in the application of energy isolating devices, must be informed use of their lock/tagout procedures. We will in turn inform them of our policies.
2. We shall ensure that the outside personnel or contractor employees understand and comply with the restrictions and prohibitions of the Creamer's energy control program, lockout/tagout procedures, and energy isolating devices.



**LOCK OUT / TAG OUT SHEET**

Tag #	Lock #	Brass #	System Affected	Estimated Duration	Date Issue	Date Returned

## SECTION 47 – MARINE SAFETY POLICY

The following apply and shall be considered when working adjacent to or about water:

- No employee of Creamer Environmental, Inc. shall enter the water under any circumstances, with the exception of abandoning ship based on a life threatening situation
- PFD's (Personal Flotation Devices) are required and shall be inspected before each use
- A designated boat operator and a qualified alternate operator shall be designated
- All water work is prohibited unless a lifesaving skiff and operator are immediately available
- Throw able device(s) with at least 90 feet of line mounted in a conspicuous location
- Distance between throw able devices should not exceed 200 feet
- Lifesaving skiff must be immediately available and ready to launch with an adequate outboard motor and oars
- Employees must work in pairs & must designate a rescue person and have a clear rescue plan in place
- All gangplanks should be 36 inches wide with proper hand and guardrails
- No refuse or materials shall be disposed overboard
- All firefighting equipment must be kept clear for access
- Aisles and gangways must be clear at all times
- At no time will any gases and their hoses be left near or in a confined space
- Two taglines are to be used for all loads
- No one is allowed to manhandle any load or walk on unstable stacked material
- Davits and other protrusions from barge deck are to be identified with yellow paint
- Hard hats, safety glasses and safety shoes worn at all times



- Always check weather and tidal conditions
- When working offshore keep a close eye for fast approaching storms especially in the Spring/Summer months
- Anytime personnel are required to work around intake structures extreme care should be taken. This includes
  - Shutting down of intake structure
  - Netting
  - Lifelines attached to the person
  - Locking out of cathodic protection
- Underwater Obstructions are found throughout the waterways both on and offshore.

Most are detailed by signs and posted on drawings

Some types to be aware of:

- Pipelines
- Electrical lines
- Cable systems/Communications
- Water Intakes and Outflow
- Sunken craft
- Reefs = both manmade and natural
- Low tide can allow areas to become very low thus damage from oyster beds and gravel bottoms to the watercraft

### **Life Saving Skiff**

- When operating a registered vessel more than 12 ft in length, personnel must be certified by the USCG with a minimum of the NJ Boater Safety Course.

**Regardless of the size of the skiff/vessel it must be equipped with the following:**

- Searchlight
- Two oars or paddles and engine per OSHA regulations
- Throw able device with line attached
- Adequate anchor and line
- Safe Egress to/from the Boat must be provided
- Life Vest for all occupants
- Regular inspection performed with written documentation

- No one is allowed to ride in a standing position unless dictated by boat design
- Shall not be loaded beyond the overall passenger capacity
- Operator is responsible for the boat at all times

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**APPENDIX II**  
**FORMS**



	Print	Sign	Company	Time In	Time Out
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25					

**12 Old Bridge Road Cedar Grove, New Jersey 07009**  
**Tel. 201-968-3300 Fax. 201-968-3301**



**DATE:** \_\_\_\_\_

**PROJECT LOCATION: 7301 Milnor St, Philadelphia, PA**

- Visitors must furnish their own Personal Protective Equipment.
- Visitors are required to sign the Daily Log and comply with Site Health and Safety Plan.

[illegible]



**CREAMER ENVIRONMENTAL, INC.**  
**HOT WORK PERMIT**

This hot-work permit is required for any activity that may produce open flame, sparks, or elevated temperatures. Activities subject to this permit include, but are not limited to: welding, cutting, or burning using acetylene/propane/butane type torches, arc-welding, or work that may generate sparks. Only personnel who have been properly trained can issue Hot-Work Permits.

<b>Permit Issued to:</b>	<b>Date:</b>
<b>Location of Proposed Work:</b>	<b>Time:</b>
<b>Permit is Valid for 24 Hours</b>	
<b>Description of Activities:</b>	
<b>Identify all hazards associated with the planned hot-work activity:</b> <ul style="list-style-type: none"><li>Burns to the body</li><li>Combustibles</li><li>Overhead loads</li></ul>	
<b>Describe precautions that must be taken prior to commencing work:</b> <ul style="list-style-type: none"><li>Proper PPE</li><li>Fire Extinguisher</li><li>Operator communication</li><li>Fire Watch Required (Circle One)    Yes    No</li></ul>	
<b>Signature of person permit issued to:</b> _____ <b>Date:</b> _____	
<b>Signature of Authorizing Supervisor:</b> _____ <b>Date:</b> _____	
<b>Signature of Permit Issuer:</b> _____ <b>Date:</b> _____	
<b>Comments:</b> Keep combustibles 35 feet away.	



## CREAMER ENVIRONMENTAL, INC. HEAT STRESS MONITORING LOG

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Time: \_\_\_\_\_

Time: \_\_\_\_\_

Time: \_\_\_\_\_

Time: \_\_\_\_\_

Name \_\_\_\_\_

**AAMHR**

Baseline Pulse	Baseline Temp
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2nd Pulse 2nd Temp

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WBGT



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**APPENDIX III**  
**(M)SDS & CHEMICAL INFORMATION**

# International Chemical Safety Cards

## POLYCHLORINATED BIPHENYL (AROCOR 1254)

ICSC: 0939



Chlorobiphenyl (54% chlorine)  
Chlorodiphenyl (54% chlorine)  
PCB  
Molecular mass: 327 (average)

ICSC # 0939

CAS # 11097-69-1

RTECS # TQ1360000

UN # 2315

EC # 602-039-00-4

October 20, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
• <b>INHALATION</b>		Ventilation.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Headache. Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection:	Separated from food and feedstuffs. Cool. Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant.	




complete protective clothing including self-contained breathing apparatus.	Note: C Xn symbol N symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II
---	--

SEE IMPORTANT INFORMATION ON BACK	
ICSC: 0939	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## POLYCHLORINATED BIPHENYL (AROCOR 54)

ICSC: 0939

IDENTIFICATION	<p><b>PHYSICAL STATE; APPEARANCE:</b> LIGHT YELLOW VISCOUS LIQUID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes in a fire producing irritating and toxic gases .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA; (skin); A3; (ACGIH 2004). MAK: 0.05 ppm, 0.70 mg/m<sup>3</sup>; H; Peak limitation category: II(8); Carcinogen category: 3B; Pregnancy risk group: B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.001 mg/m<sup>3</sup> <a href="#">See Appendix A</a> *Note: The REL also applies to other PCBs. NIOSH IDLH: Potential occupational carcinogen 5 mg/m<sup>3</sup></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. Chloracne is the most visible effect. The substance may have effects on the liver . Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
PHYSICAL PROPERTIES	<p>Relative density (water = 1): 1.5</p> <p>Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.01</p> <p>Octanol/water partition coefficient as log Pow: 6.30 (estimated)</p>
ENVIRONMENTAL DATA	<p>In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.</p>	
NOTES		
<p>changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.</p> <p>Transport Emergency Card: TEC (R)-90GM2-II-L</p>		

**ADDITIONAL INFORMATION**

**ICSC: 0939**

**POLYCHLORINATED BIPHENYL (AROCOR 1254)**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

LETTER OF TRANSMITTAL

DATE: 4/14/16	JOB NO.: 16-0463
ATTENTION: Nicholas Steenhaut	
RE: Metal Bank NPL Site	

iron International Corporation

Custom House Street

ton, MA 02110

SENDING YOU

☒

Attached

☐

Under separate cover via \_\_\_\_\_ the following items:

Shop Drawings

☐

Prints

☐

Plans

☐

Samples

☐

Specifications

Copy of letter

☐

Change order

☐

DATE	PAGES	DESCRIPTION
13/2016	2	Submittal #5.3 Vegetation Protection Plan

TRANSMITTED as checked below:

or Acceptance

☐

Approved as submitted

☐

Resubmit \_\_\_\_\_ copies for approval

or your use

☐

Approved as noted

☐

Submit \_\_\_\_\_ copies for distribution

s requested

☐

Returned for corrections

☐

Return \_\_\_\_\_ corrected print

review & comment

☐

SIGNED:

*Meghan Murphy*

Meghan Murphy  
Project Coordinator





# CREAMER ENVIRONMENTAL, INC.

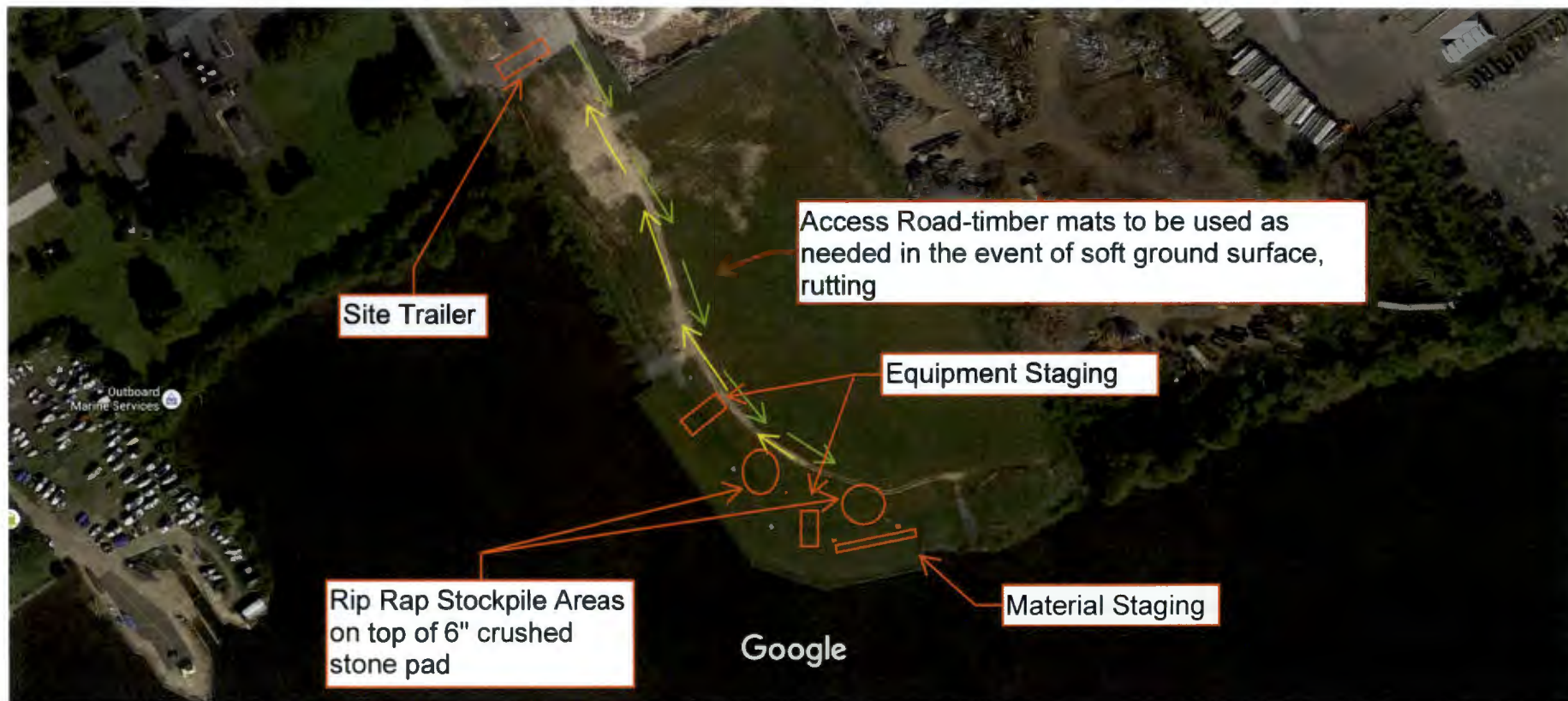
REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Vegetation Protection Plan**

It is noted that the upland area of the site consists of a vegetated, engineered soil cap. The vegetation will be protected to the extent possible through the use of a timber mat road where needed for vehicle traffic and to allow access for the rubber tired crane. Creamer Environmental, Inc. (CEI) will establish traffic flow within the work area to keep trucks and equipment on defined routes to reduce the overall footprint of the disturbed area as represented by the attached figure. Based on the volume of rip rap required there will have to be approximately 150 truckloads of rip rap moved across the site and the truck traffic will cause the topsoil to rut. The rip rap will be stockpiled on 6" of crushed stone since the clamshell will not be able to pick it up from on top of the mats without damaging them or picking them up as well. Once the rip rap is installed, CEI will pick up the stone and add the stone to the berm. In the areas where the vegetation is damaged, CEI will loosen the compacted material, re-grading the soil with a landscape rake to prepare the seedbed and ensure proper drainage to restore the site soils. CEI will seed the area with Ernst Conservation Seeds Company Native Upland Wildlife Forage and Cover Meadow Mix (ERNMIX – 123) or an approved equivalent and mulch at the completion of the work. If an equivalent seed mix is to be proposed, the EPA will be allowed to review and approve any alternatives to the seed mix. After the disturbed or compacted areas have been regraded and reseeded as described above, long-term vegetative cover monitoring and maintenance will be incorporated into the ongoing long-term monitoring program for the site, which is performed by Ramboll Environ and the results of which are reported to USEPA.



Imagery ©2016 Google, Map data ©2016 Google

Not to Scale

Google Maps



# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

**Environ International Corporation**

**20 Custom House Street**

**Boston, MA 02110**

**DATE: 4/18/16**

**JOB NO.: 16-0463**

**ATTENTION: Nicholas Steenhaut**

**RE: Metal Bank NPL Site**

**WE ARE SENDING YOU**

☐ Shop Drawings

☐ Copy of letter

☒ Attached

☐ Prints

☐ Change order

Under separate cover via \_\_\_\_\_ the following items:

☐ Plans

☐ Samples

☐ Specifications

COPIES	DATE	PAGES	DESCRIPTION
1	4/18/2016	1	Submittal #6.3 Materials

**THESE ARE TRANSMITTED as checked below:**

☒ For Acceptance

☐ For your use

☐ As requested

☐ Review & comment

☐ Approved as submitted

☐ Approved as noted

☐ Returned for corrections

☐ \_\_\_\_\_

☐ Resubmit \_\_\_\_\_ copies for approval

☐ Submit \_\_\_\_\_ copies for distribution

☐ Return \_\_\_\_\_ corrected print

**REMARKS**

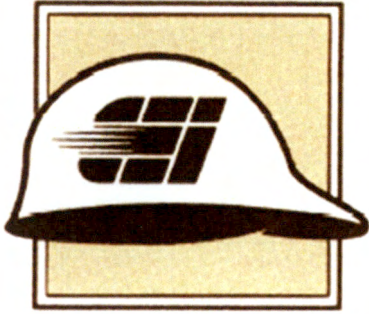
**COPY TO:** \_\_\_\_\_

**SIGNED:** \_\_\_\_\_

*Meghan Murphy*

**Meghan Murphy**  
**Project Coordinator**





# CREAMER ENVIRONMENTAL, INC.

REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Materials**

<b>Vendor</b>	<b>Material(s)**</b>
HK Group Birdsboro Quarry	R6 Rip Rap
Highway Materials, Inc. Skyline Steel, LLC	Crushed Stone Structural Steel- MC12x31 HP8x36 Epoxy Coating
Dywidag-Systems International	Tie-Rod Hardware for Extensions
Apex Services, Inc.	Chain Link Fence

\*Material information for any additional permanent materials will be provided for approval prior to procurement.



**Rip Rap**

November 18, 2013

John Janssen  
Birdsboro Materials  
Div/Haines & Kibblehouse, Inc.  
P.O. Box 196  
Skipack, PA 19474

Re: Jetty Repair  
Birdsboro Materials  
AET Project No. 24-00700

Mr. Janssen:

This report presents the results of our petrographic review of one rip rap sized gabbroic rock. The 195 lbs sample was submitted to our laboratory by Mr. John Janssen on October 10, 2013. We understand the sample was produced at Birdsboro Materials, Skipack, PA. We understand the material was reportedly sampled from a stockpile. The scope of our work was limited to performing petrographic analysis per ASTM D4992 "Standard Practice for Evaluation of Rock to be Used for Erosion Control" on the stone sample to provide a geological description of the stone and comment upon its use as rip rap. Freezing and Thawing Evaluation (ASTM D5312), Specific Gravity and Absorption (ASTM D6473), and Los Angeles Abrasion (ASTM C535) were also performed on the sample.

### Conclusions

Based on the work performed and previous experience, our observations and opinions are as follows:

The stone sample was comprised of a fine to medium grained, phaneritic, and "interlocking" textured altered-gabbro. The stone was "massive" exhibiting no layering or lineation. An approximately 1mm (1/32") amphibole-chlorite vein and several amphibole veinlets were observed near the outer edge of the sample. A few fractures and micro-fractures were observed in the rock oriented sub-perpendicular to the amphibole-chlorite vein. The fractures give the stone the potential to spall in a freeze-thaw environment. The gabbroic stone appears to be of good quality for use as rip rap.

The core of the altered-gabbro sample is relatively "fresh", however an alteration "rind", approximately 30mm (1-3/16") thick, was observed along the outer surface of the sample. In the alteration "rind" feldspars have undergone light to moderate alteration to sericite (sericitization) and calcite. Also, pyroxenes have undergone moderate alteration to chlorite (chloritization) and serpentine (serpentinization). This common, finely-disseminated alteration poses no danger to the lifespan of the stone. The gabbro is generally comprised



of, in descending order: plagioclase, amphibole, pyroxene, sericite, chlorite, biotite, titanite, calcite, serpentine, apatite, magnetite/ilmenite, quartz, and zircon. No readily soluble minerals were observed in either type of rock.

### **Procedures**

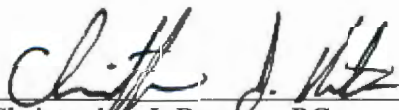
Our work was performed on October 17, 2013 and subsequent dates. The analysis was completed through the use of optical microscopy on epoxy mounted, sawcut, and lapped hand sample and thin section. The review was performed in general accordance with Standard Operating Procedure 00 LAB 004, "Petrographic Examination of Aggregates for Concrete, ASTM: C295". Observations were made using an Olympus SZX-12 stereo-zoom binocular microscope with magnification up to 160x and an Nikon E6000 polarizing light microscope with magnification up to 600x. The analysis included reviewing a thin section of the stone sample under plane and cross polarized light conditions.

### **Remarks**

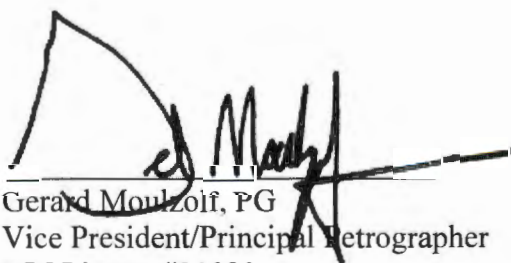
The test samples will be retained for at least 60 days from the date of our report. If no further instructions are received by that time, the samples may be discarded. The petrographic services for this project have been conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in this area under similar budget and time constraints. The test results relate only to the samples tested. No warranty, express or implied, is made.

It has been a pleasure to serve you on this project. Should you have any questions on this report, please do not hesitate to call.

Sincerely,  
American Engineering Testing, Inc.



Christopher J. Braaten, PG  
Petrographer/Geologist  
MN License #48312



Gerard Moulzolf, PG  
Vice President/Principal Petrographer  
MN License#30023  
Phone: 651-659-1346  
[gmoulzolf@amengtest.com](mailto:gmoulzolf@amengtest.com)

**PETROGRAPHIC EXAMINATION OF AGGREGATES, ASTM C295**

**TEST JOB NO:** 24-00700  
**AMPLE ID:** Birdsboro

**DATE:** 11-11-2013  
**PETROGRAPHER:** C. Braaten/B. Lemcke

**DESCRIPTION:**

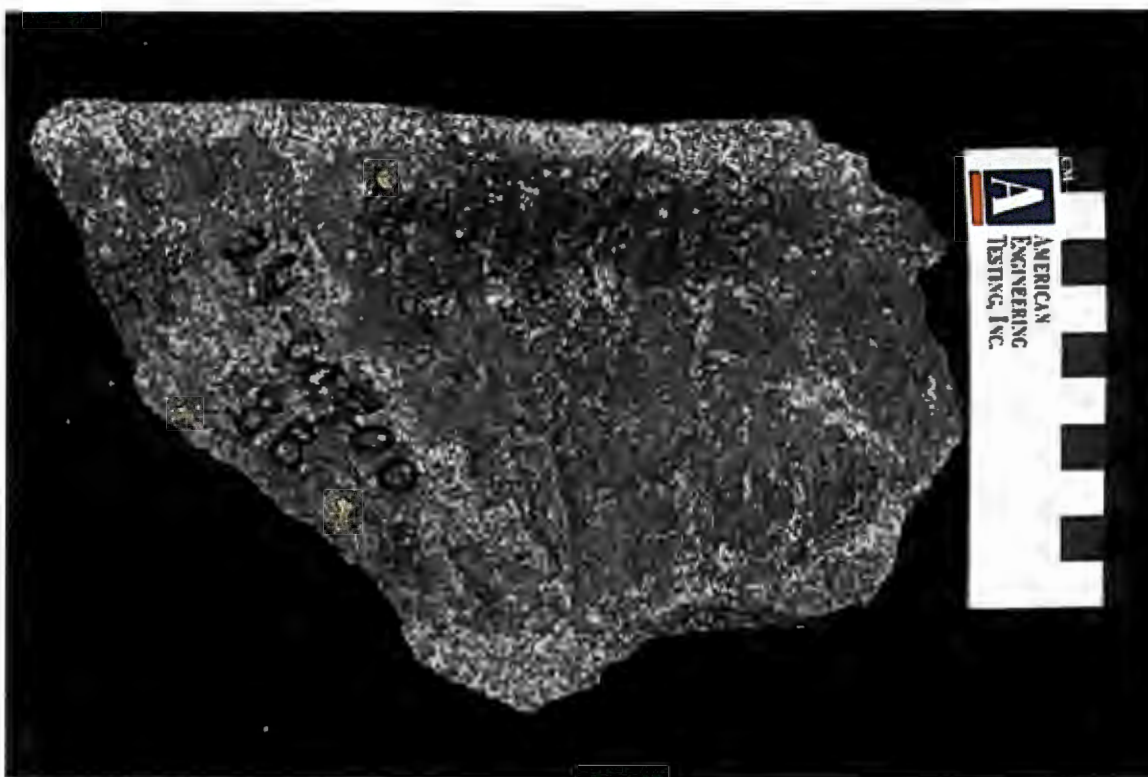
Rock was mottled white, light gray, and grayish black (Munsell® N9, N7, and N2). The rock was observed to have a fine to medium grained altered-gabbro. The rock displayed an inequigranular, phaneritic, interlocking texture. The plagioclase crystals were subhedral to euhedral. The pyroxene crystals were anhedral to subhedral. Few of the plagioclase crystals showed a myrmekitic (plagioclase intergrowths) texture. Several of the pyroxene crystals showed the schiller effect (pyroxene intergrowths). Uralization of several pyroxenes was observed (pyroxene converting to amphibole). An approximately 1mm wide vein of amphibole and chlorite was observed crosscutting the sample. Also, several veinlets, approximately 0.05mm wide, of amphibole were observed crosscutting the vein at an approximately 45 degree angle. A few microcracks were observed oriented perpendicular to the amphibole-chlorite vein. A few fractures were observed in the rock oriented sub-parallel to the amphibole-chlorite vein. The stone was "massive" exhibiting no layering or lineation. The mineral assemblage included: sericitization of plagioclase, plagioclase weathering to calcite, chloritization of pyroxene, and chloritization of biotite and pyroxenes. The majority of the weathering of the rock was located along the outer edges of the rock sample.

<b>MINERALOGY:</b>		<b>OPTICAL PROPERTIES:</b>			
<b>MINERALS</b>	<b>VOL(%)*</b>	<b>COLOR</b>	<b>BIREFRINGENCE</b>	<b>RELIEF</b>	<b>OTHER</b>
Quartz	trace	colorless	low 1 <sup>st</sup> order	low	commonly polygonal, moderate undulatory extinction
Plagioclase	35 – 40	colorless	low 1 <sup>st</sup> order	low	albite twinning
Pyroxene	10 – 15	colorless light green	1 <sup>st</sup> to 2 <sup>nd</sup> order	moderate to high	converting to amphibole
Amphibole	15 - 20	pleo. green	2 <sup>nd</sup> order, masked	moderate to high	converted from pyroxene
Biotite	2	pleo. green/brown	3 <sup>rd</sup> to 4 <sup>th</sup> order, masked	moderate	alteration to chlorite
Actinolite	1	colorless pale green	1 <sup>st</sup> order	low	alteration product of pyroxene
Sericite	10 - 15	colorless	high 1 <sup>st</sup> order	low	alteration product of plagioclase
Chlorite	2	pleo. green	anomalous blue	moderate	alteration product of biotite
Calcite	1	colorless	low 1 <sup>st</sup> order	moderate	acicular, hexagonal basal sections
Monazite	trace	colorless	high 3 <sup>rd</sup> to 4 <sup>th</sup> order	very high	zircon halos in biotite
Ilmenite	1 - 2	light tan	3 <sup>rd</sup> to 4 <sup>th</sup> order	high	subhedral along vein
Calcite	1 - 2	colorless	high 3 <sup>rd</sup> to 4 <sup>th</sup> order	variable	alteration product of plagioclase
Ilmenite/ Magnetite	2 - 3	opaque	--	--	<b>ilmenite:</b> violet, black in reflected light, weakly magnetic <b>magnetite:</b> steel blue-black in reflected light, strongly magnetic

\* Based on visual estimation of thin section



PHOTO: 1



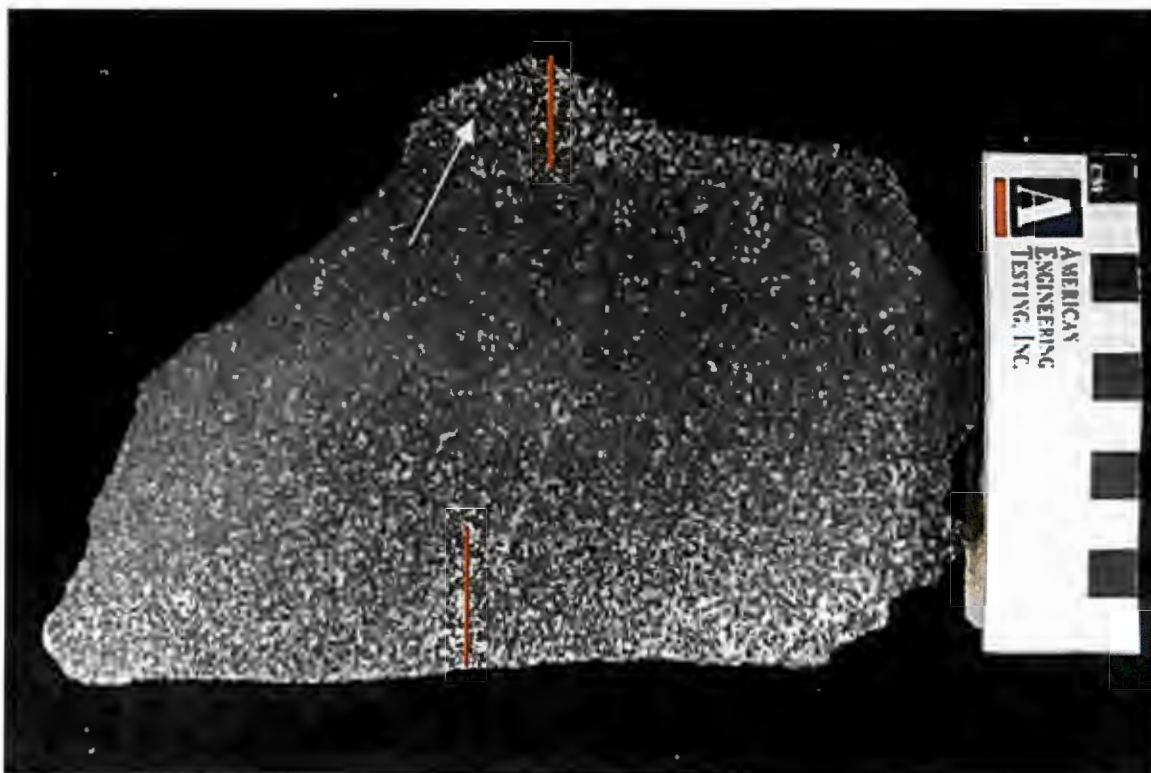
SAMPLE ID:

Birdsboro  
Materials

DESCRIPTION:

View of the outer surface of the altered-gabbro. Note the stone being “massive” exhibiting no layering or lineation.

PHOTO: 2



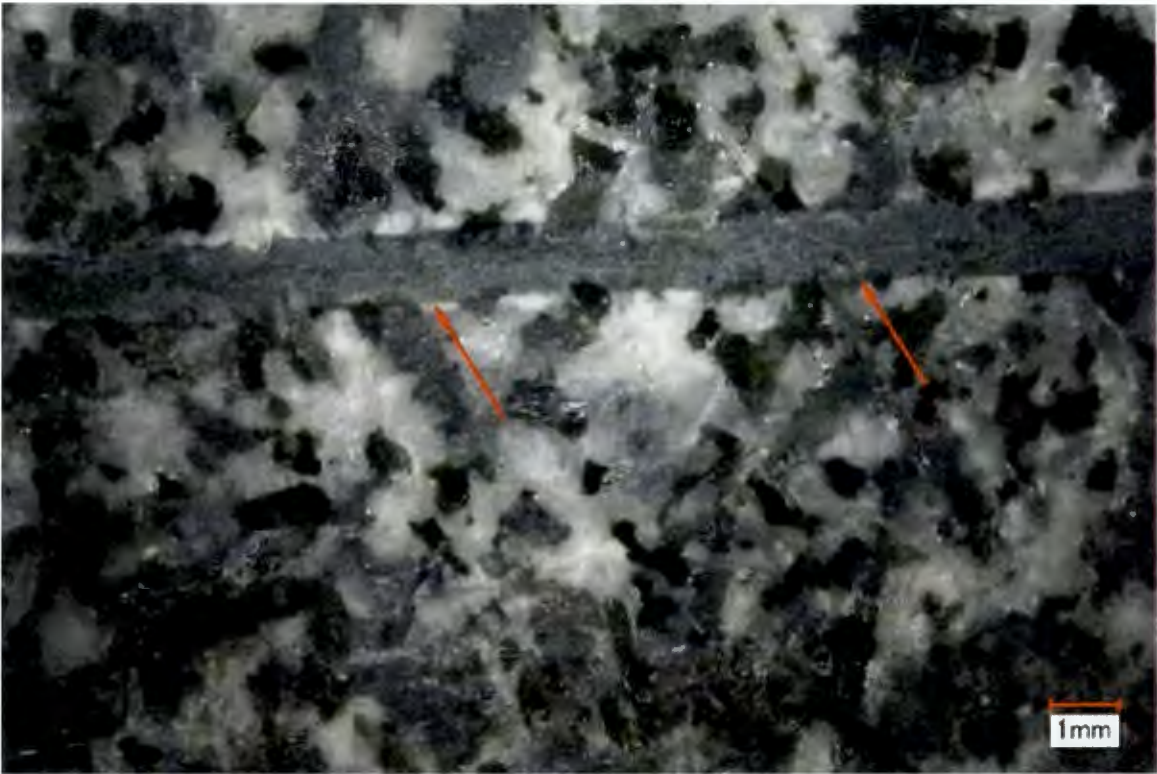
SAMPLE ID:

Birdsboro  
Materials

DESCRIPTION:

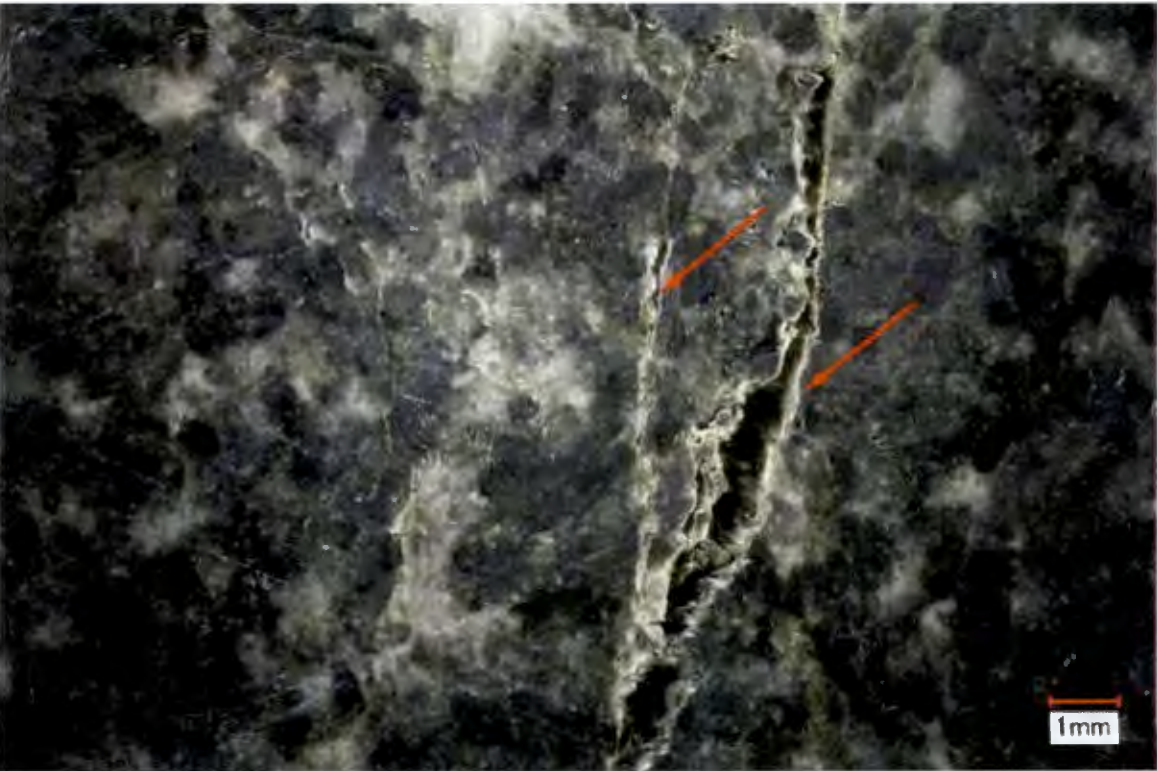
View of cut and polished altered-gabbro. Note the alteration “rind” on the outer surfaces (red bars) and the location of the amphibole-chlorite vein (white arrow).





Birdsboro  
Materials  
20x

**DESCRIPTION:** Sawcut and lapped cross section of altered-gabbro under magnification. Note the “interlocking” crystal texture and the amphibole-chlorite vein (red arrows).

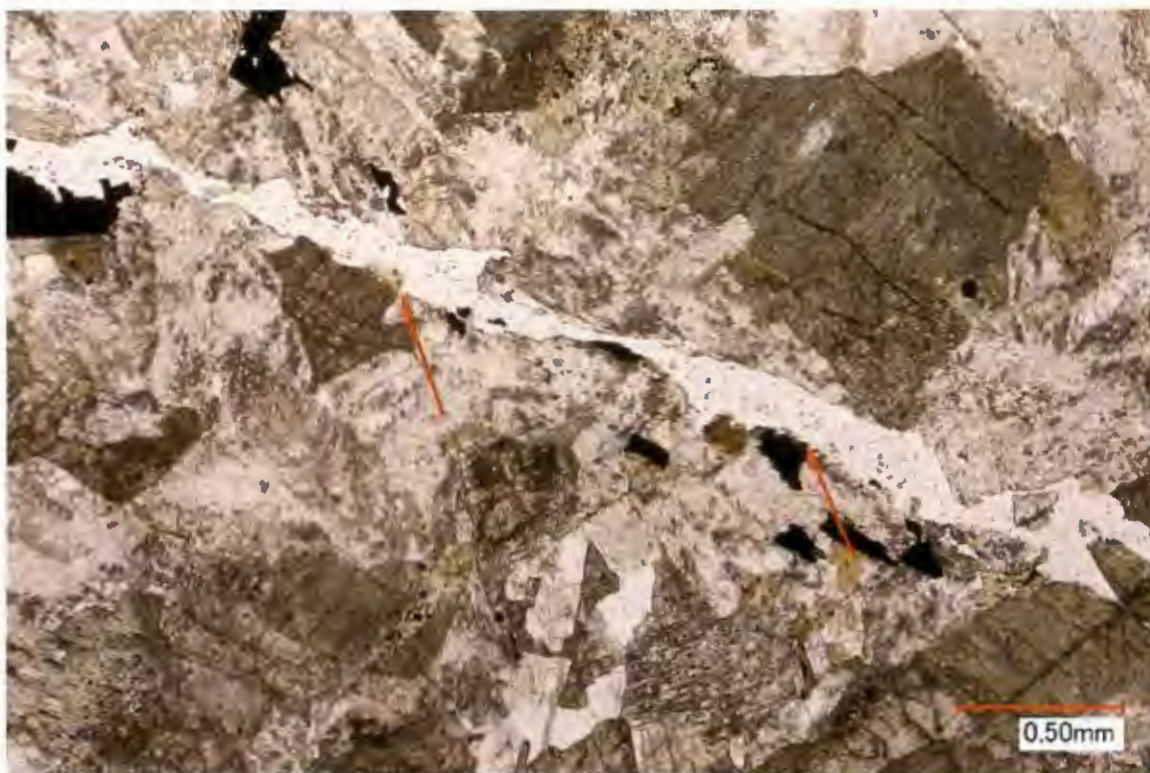


Birdsboro  
Materials  
20x

**DESCRIPTION:** Sawcut and lapped cross section of altered-gabbro under magnification. Note the micro-fractures (red arrows) within the sample.



PHOTO: 5



SAMPLE ID:

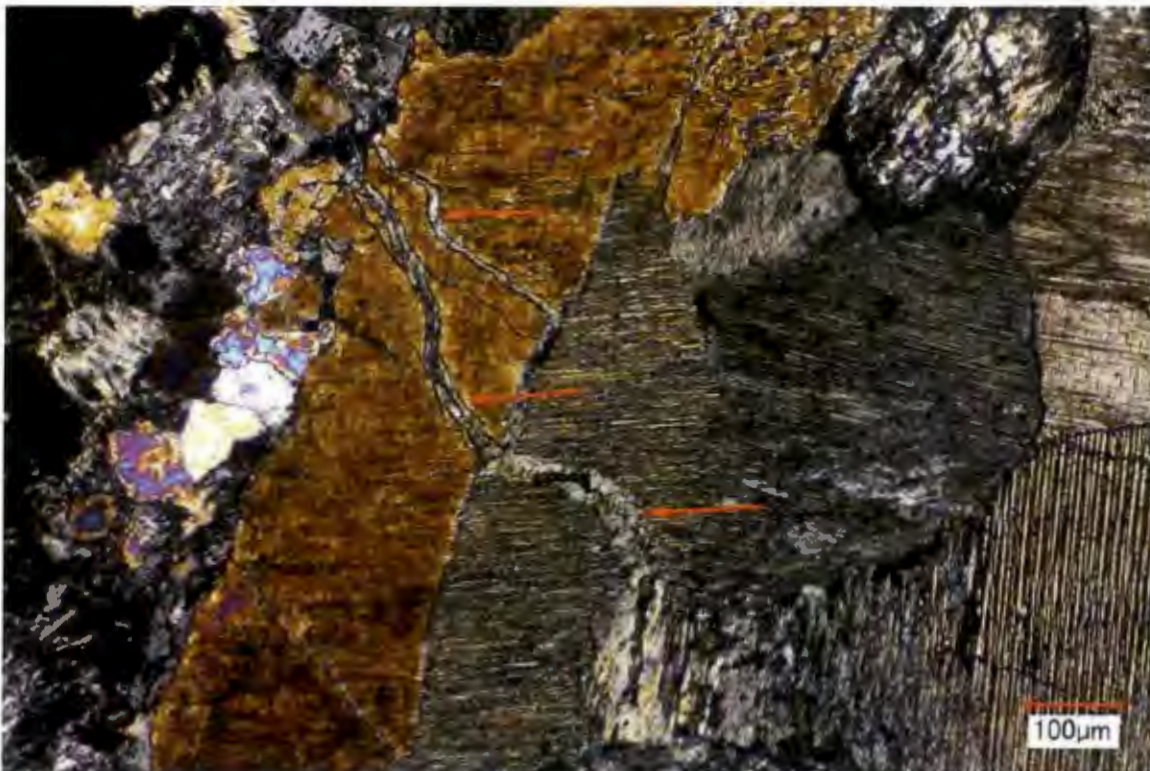
Birdsboro  
Materials  
40x

DESCRIPTION:

View of a micro-fracture (red arrows) in thin section under transmitted plane polarized light.

MAG:

PHOTO: 6



SAMPLE ID:

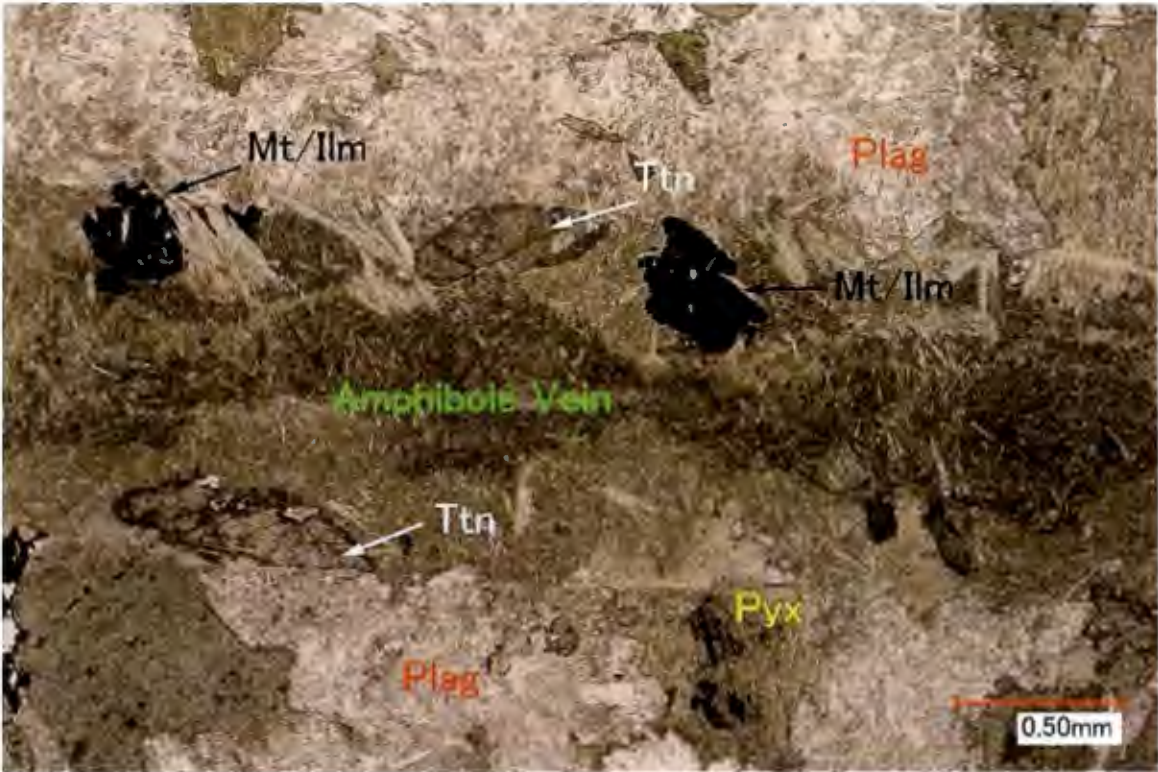
Birdsboro  
Materials  
100x

DESCRIPTION:

View of amphibole veinlets (red arrows) in thin section under transmitted cross polarized light.

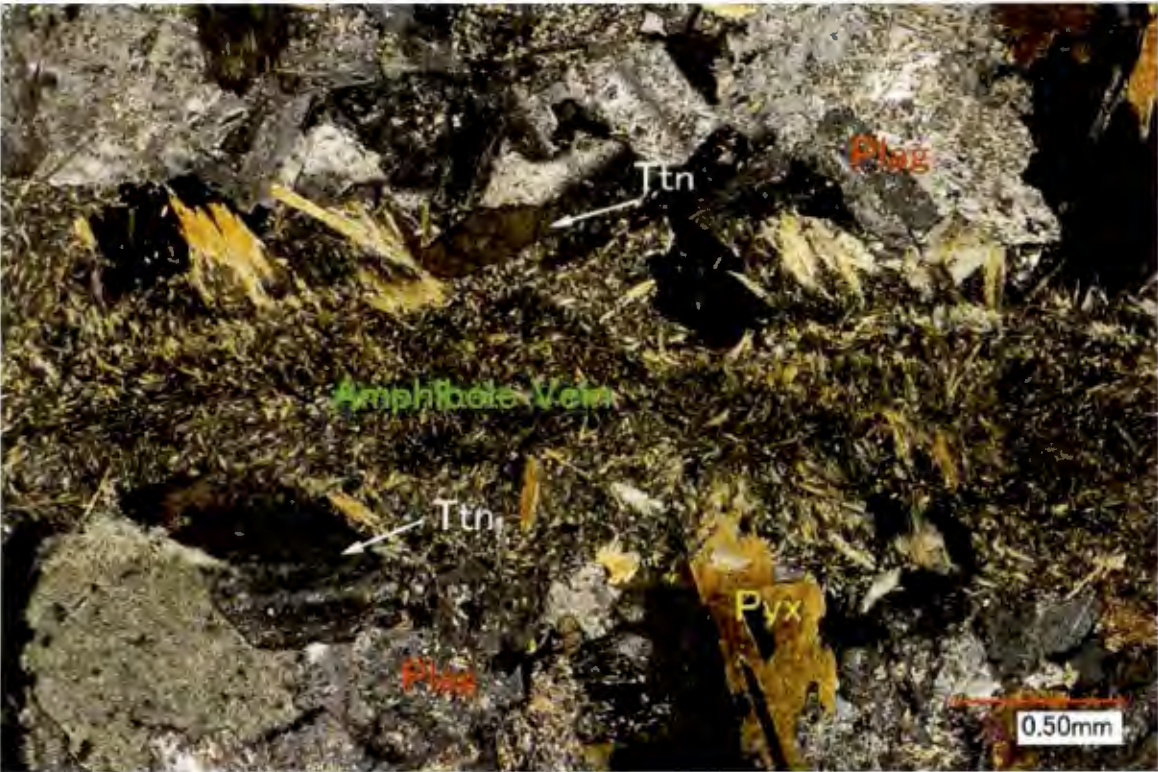
MAG:





Birdsboro Materials 40x

**DESCRIPTION:** Overall view of the altered-gabbro in thin section under transmitted plane polarized light. Note minerals plagioclase (Plag), pyroxene (Pyx), titanite (Ttn), magnetite/ilmenite (Mt/Ilm), and an amphibole-chlorite vein.



Birdsboro Materials 40x

**DESCRIPTION:** Overall view of the altered-gabbro in thin section under transmitted cross polarized light. Note the amphibole-chlorite vein.





CONSULTANTS  
· ENVIRONMENTAL  
· GEOTECHNICAL  
· MATERIALS  
· FORENSICS

## **REPORT OF FREEZE-THAW TESTING** **ASTM D5312-12**

**PROJECT:**  
JETTY REPAIR  
BIRDSBORO QUARRY

**REPORTED TO:**  
BIRDSBORO QUARRY  
DIV/ HAINES & KIBBLEHOUSE, INC.  
P.O. BOX 196  
SKIPPACK, PA 19474

**ATTN:** JOHN JANSSEN

**AET JOB NO:** 24-00700

**DATE:** DECEMBER 20, 2013

---

### **INTRODUCTION**

This report presents the results of laboratory work performed by our firm on five, rip rap sized, gabbroic rock samples submitted to us by John Janssen on October 10, 2013. We understand the sample was produced at the Birdsboro Quarry, Skippack, PA. We understand the material was reportedly sampled from a stockpile. The scope of our work was limited to performing freeze-thaw analysis per ASTM D5312 "Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions" on the stone samples to provide the durability of the stone and comment upon its use as rip rap. Petrographic Evaluation (ASTM D4992), Specific Gravity and Absorption (ASTM D6473), and Los Angeles Abrasion (ASTM C535) were also performed on the sample.

### **SAMPLE IDENTIFICATION**

Sample Identification:	Birdsboro Quarry
Sample Type:	Crushed Altered-Gabbro
Original Sample Size, lbs:	195

### **TEST RESULTS**

Planes of weakness were noted prior to freezing and thawing. The majority of the planes of weakness were associated with macro-fractures, micro-fractures, and mineral veins crosscutting the samples. There were no signs of damage/breakage along any of the noted planes of weakness. The table represents the difference between the oven-dried mass prior to testing and the oven-dried mass after the completion of testing, divided by the oven-dried mass prior to testing and multiplied by 100 to give a percent loss. Percent loss results are as follows:

ASTM D5312-12	1	2	3	4	5
Percent loss:	0.03	0.01	0.03	0.02	0.03
Breakage:	None	None	None	None	None

### **PROCEDURES**

The test specimens were sawed slabs of gabbro 2.5" to  $\pm 0.25$ " thick. The samples were examined both macroscopically and microscopically. These observations were made using an Olympus SZX-12 stereo-zoom binocular microscope with magnification up to 160x. The samples were photographed prior to testing. Existing cracks and/or defects were marked prior to testing.

The samples were dried to a constant mass in an oven at  $230 \pm 9^{\circ}\text{F}$  ( $110 \pm 5^{\circ}\text{C}$ ) and weighed to get the initial oven-dry mass. The samples were placed saw surface down on an absorptive pad in containers and immersed in 0.5% isopropyl alcohol/water solution for 12 hours at  $73 \pm 3^{\circ}\text{F}$  ( $22.8 \pm 1.7^{\circ}\text{C}$ ). The water level was adjusted to height which the absorptive pad is just immersed. Then the containers were placed in the freeze/thaw chamber at  $0 \pm 5^{\circ}\text{F}$  ( $-18^{\circ}\text{C}$ ) for a minimum of 12 hours. After the 12 hour freezing, the containers holding the immersed test specimens thawed at a temperature of  $90^{\circ}\text{F}$  ( $32^{\circ}\text{C}$ ) for a minimum of 8 hours. This completes one cycle.

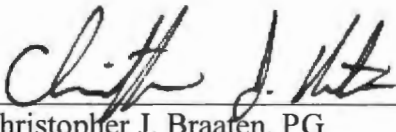
After every 5 cycles, the samples were visually examined for any changes which may have occurred over the duration of the test. No changes were noted. After 40 cycles, the largest remaining piece of the samples were oven-dried and was weighed to determine the oven-dried mass. The difference between the oven-dried mass prior to testing and the oven-dried mass after the completion of testing is divided by the oven-dried mass prior to testing and multiplied by 100 to give a percent loss. The presences of any cracks or breakage were noted.

**REMARKS**

Our work was performed on October 17, 2013 and subsequent dates. The test samples will be retained for at least 60 days from the date of our report. If no further instructions are received by that time, the samples may be discarded. The petrographic services for this project have been conducted in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in this area under similar budget and time constraints. The test results relate only to the samples tested. No warranty, express or implied, is made.

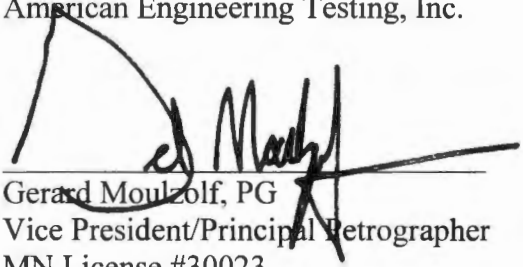
It has been a pleasure to serve you on this project. Should you have any questions on this report, please do not hesitate to call.

Report Prepared by:  
American Engineering Testing, Inc.



Christopher J. Braaten, PG  
Petrographer/Geologist  
MN License #48312

Report Reviewed by:  
American Engineering Testing, Inc.



Gerard Moulzolf, PG  
Vice President/Principal Petrographer  
MN License #30023  
Phone: 651-659-1346  
[gmoulzolf@amengtest.com](mailto:gmoulzolf@amengtest.com)





Birdsboro Quarry **DESCRIPTION:** Sample #1 after sawing and prior to freezing and thawing.



Birdsboro Quarry **DESCRIPTION:** Sample #1 after 40 cycles of freezing and thawing.

AET PROJECT NO:

24-00700

DATE: DECEMBER 20, 2013

PROJECT:

JETTY REPAIR – BIRDSBORO QUARRY

PHOTO: 3



SAMPLE ID:

Birdsboro Quarry

DESCRIPTION:

Sample #2 after sawing and prior to freezing and thawing.

PHOTO: 4



SAMPLE ID:

Birdsboro Quarry

DESCRIPTION:

Sample #2 after 40 cycles of freezing and thawing.



Birdsboro Quarry **DESCRIPTION:** Sample #3 after sawing and prior to freezing and thawing.



Birdsboro Quarry **DESCRIPTION:** Sample #3 after 40 cycles of freezing and thawing.



PHOTO: 7



SAMPLE ID:

Birdsboro Quarry

DESCRIPTION:

Sample #4 after sawing and prior to freezing and thawing.

PHOTO: 8



SAMPLE ID:

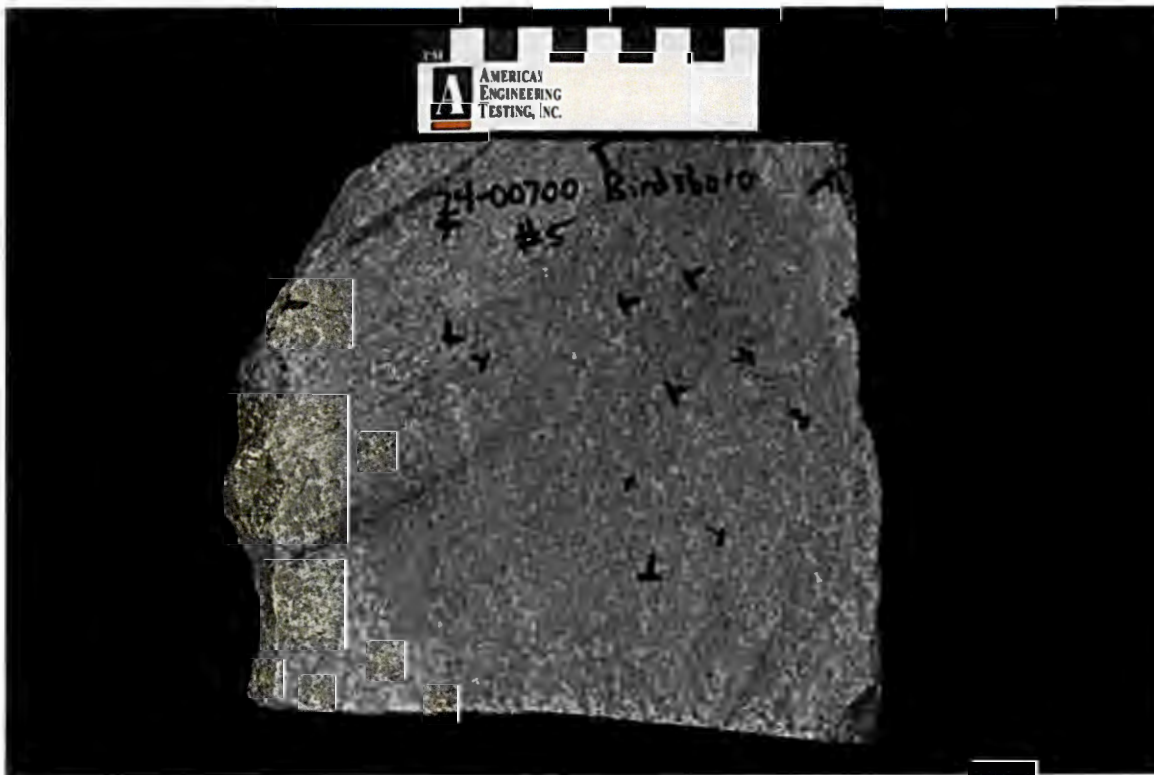
Birdsboro Quarry

DESCRIPTION:

Sample #4 after 40 cycles of freezing and thawing.



Birdsboro Quarry **DESCRIPTION:** Sample #5 after sawing and prior to freezing and thawing.



Birdsboro Quarry **DESCRIPTION:** Sample #5 after 40 cycles of freezing and thawing.



AMERICAN  
ENGINEERING  
TESTING, INC.

CONSULTANTS  
• ENVIRONMENTAL  
• GEOTECHNICAL  
• MATERIALS  
• FORENSICS

**REPORT OF SPECIFIC GRAVITY TESTING**

**PROJECT:**  
JETTY REPAIR

**REPORTED TO:**  
BIRDSBORO MATERIALS  
DIV/HAINES & KIBBLEHOUSE, INC  
PO BOX 196  
SKIPPACK, PA 19474

**ATTN:** JOHN JANSSEN

**AET PROJECT NO:** 24-00700

**DATE:** OCTOBER 22, 2013

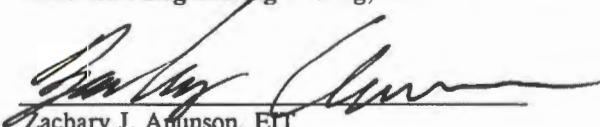
**AET SAMPLE NUMBER:** W1-S1  
**SAMPLE LOCATION:** Birdsboro Materials H+K Crushed

**Specific Gravity:**  
Bulk Dry / Apparent / Bulk SSD      ASTM D6473  
Absorption, %      2.927 / 2.958 / 2.938  
0.4


**Los Angeles Abrasion, %**      ASTM C535      15.9

**REMARKS:** Sample W1-S1 was submitted to our laboratory on October 16, 2013 by John Janssen of Birdsboro Materials. ASTM C535 was modified using 3395.1g of 1" material and 6609.1g of 3/4" material. The sample was discarded after testing.

Report Prepared By:  
American Engineering Testing, Inc.

  
Zachary J. Anunson, EIT  
Aggregate Lab Coordinator  
[zanunson@amengtest.com](mailto:zanunson@amengtest.com)

Report Reviewed By:  
American Engineering Testing, Inc.

  
David G. Wirth  
Manager, Construction Services  
[dwirth@amengtest.com](mailto:dwirth@amengtest.com)  
651-659-1373





**Crushed Stone**



Plymouth Meeting Quarry  
5100 Joshua Road  
Plymouth Meeting, PA 19462

Scale House 610-828-4300  
fax 610-828-5696  
Laboratory 610-825-9118  
Sales 610-834-2088

March 17, 2016

Meghan Murphy  
Creamer Enviromental  
e-mail: [mmurphy@creamerenviromental.com](mailto:mmurphy@creamerenviromental.com)

RE: Metal Bank

Dear Meghan:

The following sheets contain the average gradation results for the aggregate requested, which is produced at the Highway Materials, Plymouth Meeting plant. This plant is a Penn DOT approved source of materials furnished to State projects.

We thank you for your inquiry and would gladly supply you with any other information that you request.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jerry Gialanella', written over a horizontal line.

Jerry Gialanella  
Highway Materials, Inc.



Plymouth Meeting Quarry  
5100 Joshua Road  
Plymouth Meeting, PA 19462

BULLETIN 14 # HMC46B14  
PA DOT APPROVED SOURCE

Attention: Meghan Murphy  
Contractor: Creamer Environmental  
Material: AASHTO # 3  
Date: 3/16/2016

The following are recent typical sieve analyses of AASHTO # 3 produced at Highway Materials, Plymouth Meeting Quarry:

Sample #	1	2	3	SPECIFICATION
	% passing	% passing	% passing	REQUIREMENTS
Sieve Size				
1/2"	2			0 - 5
1"	3.8			0 - 15
1 1/2"	55.5			35 - 70
	95.9	95.7	95.3	
2"	100	100	100	90 - 100
2 1/2"	100			100

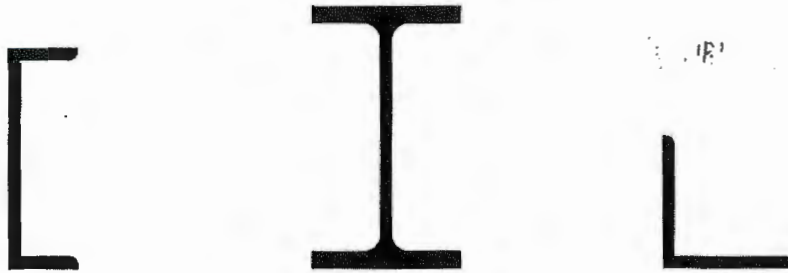
Visual Description	Beige
Material Class	Dolomite Limestone
ASR	
Absorption %	
Skid Resistance Level	
LA Abrasion %	
Sodium Sulfate Soundness	
Unit Weight (Loose) (lbs/cu ft)	107
Unit Weight (Rodded) (lbs/cu ft)	115
Void%	
Specific Gravity (Bulk)	
Specific Gravity (SSD)	
Tons / cu yd.	1.458
Wash Loss	9.20%
Tested by:	Ray Gonzalez
Phone:	610-825-9118





# **Structural Steel Waler Coating**

# Structural Sections



BEAM Available Steel Grades								
AMERICAN			CANADIAN			EUROPEAN*		
ASTM	YIELD STRENGTH		CSA G40.21	YIELD STRENGTH		EN 10025 & EN 10113	YIELD STRENGTH	
	(ksi)	(MPa)		(ksi)	(MPa)		(ksi)	(MPa)
A 36	36	250	Grade 350 W	50	350	S 235	34	235
A 572 Grade 50	50	345				S 275	40	275
A 588	50	345				S 355	51	355
A 709	50	345				S 460 HISTAR	67	460
A 913	50	345						
A 913	65	450						
A 992	50	345						

\*HISTAR only available in some sizes.

## Delivery Conditions & Tolerances

ASTM A 6			
Mass	± 2.5%		
Depth	± 0.125 Inches		
Length	30 feet and under	Over 30 Feet	
Beams W 24 and Under	± 0.375 Inches	+ ( 0.375 Inches + (Length - 30) / 80	-0.375 Inches
Beams Over W 24	± 0.5 Inches	+ ( 0.5 inches + (Length - 30) / 80	-0.375 Inches
Flanges out of Square			
Beams W 12 and Under	≤ 0.25 Inches		
Beams Over W 12	≤ 0.3125 Inches		
Web off Center	≤ 0.1875 inches		
Greatest Depth over Theoretical	≤ 0.25 Inches		
Camber and Sweep	(0.125 in) * (Length / 10)		
Camber and Sweep for Columns*			
45 Feet and Under	(0.125 in) * (Length / 10) but not over 0.375 inches		
Over 45 Feet	(0.375 in) + (0.125 in * (Length - 45) / 10		

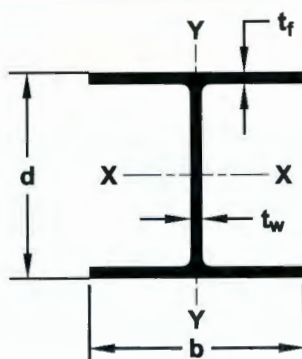
\*W 8 x 31 and heavier, W 10 x 49 and heavier, W 12 x 65 and heavier, and W 14 x 90 and heavier order as columns. If other sections are ordered as columns, the tolerances are subject to negotiation with manufacturer.

# HP

Steel H-Piles

ArcelorMittal

skylinesteel I



SECTION	Weight lb/ft (kg/m)	Area in <sup>2</sup> (cm <sup>2</sup> )	Depth d in (mm)	Flange Width b in (mm)	THICKNESS		Coating Area ft <sup>2</sup> /ft (m <sup>2</sup> /m)	ELASTIC PROPERTIES					
					Flange (t <sub>f</sub> ) in (mm)	Web (t <sub>w</sub> ) in (mm)		AXIS X-X			AXIS Y-Y		
								I in <sup>4</sup> (cm <sup>4</sup> )	S in <sup>3</sup> (cm <sup>3</sup> )	r in (cm)	I in <sup>4</sup> (cm <sup>4</sup> )	S in <sup>3</sup> (cm <sup>3</sup> )	r in (cm)
HP 8 HP 200	36	10.6	8.02	8.155	0.445	0.445	3.92	119	29.8	3.36	40.3	9.88	1.95
HP 10 HP 250	42	12.4	9.70	10.075	0.420	0.415	4.83	210	43.4	4.13	71.7	14.2	2.41
	57	16.8	9.99	10.225	0.565	0.565	4.91	294	58.8	4.18	101	19.7	2.45
HP 12 HP 310	53	15.5	11.78	12.045	0.435	0.435	5.82	393	66.9	5.03	127	21.1	2.86
	63	18.4	11.94	12.125	0.515	0.515	5.86	472	79.1	5.06	153	25.3	2.88
	74	21.8	12.13	12.215	0.610	0.605	5.91	569	93.8	5.11	186	30.4	2.92
	84	24.6	12.28	12.295	0.685	0.685	5.97	650	106	5.14	213	34.6	2.94
HP 14 HP 360	73	21.4	13.61	14.585	0.505	0.505	6.96	729	107	5.84	261	35.8	3.49
	89	26.1	13.83	14.695	0.615	0.615	7.02	904	131	5.88	326	44.3	3.53
	102	30	14.01	14.785	0.705	0.705	7.06	1050	150	5.92	380	51.4	3.56
	117	34.4	14.21	14.885	0.805	0.805	7.69	1220	172	5.96	443	59.5	3.59
HP 16 HP 410	88	25.8	15.33	15.665	0.540	0.540	7.52	1112	145	6.56	347	44.0	3.66
	101	29.8	15.50	15.750	0.625	0.625	7.56	1297	167	6.60	408	52.1	3.70
	121	35.7	15.75	15.875	0.750	0.750	7.62	1578	200	6.65	501	63.1	3.75
	141	41.7	16.00	16.000	0.875	0.875	7.69	1871	234	6.70	599	75.2	3.79
	162	47.7	16.25	16.125	1.000	1.000	7.75	2175	268	6.75	701	87.0	3.83
	183	53.8	16.50	16.250	1.125	1.125	7.81	2492	302	6.81	807	99.0	3.87
HP 18 HP 460	135	39.8	17.50	17.750	0.750	0.750	8.54	2196	251	7.43	700	78.8	4.19
	157	46.2	17.74	17.870	0.870	0.870	8.60	2583	291	7.48	829	93.0	4.24
	181	53.2	18.00	18.000	1.000	1.000	8.66	3017	335	7.53	974	108.1	4.28
	204	60.0	18.25	18.125	1.125	1.125	8.73	3450	378	7.58	1119	123.0	4.32





# H-Piles

Available Steel Grades								
AMERICAN			CANADIAN			EUROPEAN**		
ASTM	YIELD STRENGTH		CSA G40.21	YIELD STRENGTH		EN 10034	YIELD STRENGTH	
	(ksi)	(MPa)		(ksi)	(MPa)		(ksi)	(MPa)
	36		Grade 300 W	44		HISTAR 355	51	
2 Grade 50*	50		Grade 350 W	50		HISTAR 420	61	
8	50					HISTAR 460	67	
0	50							

ard grade for H-Piles.

\*\*HISTAR only available in some sizes.

## Splicer and Cutting Shoe



Splicer



HP Point

## Delivery Conditions & Tolerances

ASTM A 6		
	± 2.5%	
Feet and Under	± 0.375 inches	
er 30 Feet	+ (0.375 inches + (Length in Feet - 30)/80)	- 0.375 inches
	± 0.125 inches	
ge Width	+ 0.25 inches	- 0.1875 inches
ges out of Square		
8 x 36 - HP 12 x 84	≤ 0.25 inches	
14 x 73 - HP 18 x 204	≤ 0.3125 inches	
off Center	≤ 0.1875 inches	
test Depth over Theoretical	≤ 0.25 inches	
ber and Sweep***		
Feet and Under	(0.125 inches)(Length in Feet/10) but not over 0.375 inches	
er 45 Feet	(0.375 inches) + (0.125 inches (Length in Feet - 45)/10)	
the HP 10 x 42, 12 x 53, 12 x 63, 14 x 73, 14 x 89, and all 16 and 18 inch sections tolerances are subject to negotiation with manufacturer.		

## Minimum Rolled Lengths†

100 feet  
Other lengths may be possible upon request.



# Protective & Marine Coatings

## TARGUARD® COAL TAR EPOXY

PART A  
PART A  
PART B

B69B60  
B69R60  
B69V60

BLACK  
RED  
HARDENER

Revised: November 3, 2014

### PRODUCT INFORMATION

4.72

#### PRODUCT DESCRIPTION

TARGUARD COAL TAR EPOXY is a high build, polyamide epoxy coal tar coating.

Meets the following specifications:

- Corps of Engineers Formula C-200a
- SSPC Paint 16 Specification
- AWWA C-210, Non-Potable Water Applications

#### PRODUCT CHARACTERISTICS

Finish:	Semi-Gloss
Color:	Black, Red
Volume Solids:	74% ± 2%, mixed
Weight Solids:	82% ± 2%, mixed
VOC (calculated): mixed	Unreduced: <250 g/L; 2.08 lb/gal Reduced 10%: <300 g/L; 2.5 lb/gal
Mix Ratio:	2 component, premeasured 4:1 5 gallons mixed

#### Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	11.0 (275)	22.0 (550)
Dry mils (microns)	8.0* (200)	16.0* (400)
~Coverage sq ft/gal (m <sup>2</sup> /L)	74 (1.8)	148 (3.6)
Theoretical coverage sq ft/gal (m <sup>2</sup> /L) @ 1 mil / 25 microns dft	1184 (29)	

\*See Performance Tips section

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

#### Drying Schedule @ 11.0 mils wet (275 microns):

	@ 50°F/10°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	14 hours	8-10 hours	2 hours
To recoat:			
minimum:	48 hours	18 hours	5 hours
maximum:	72 hours	72 hours	12 hours
To cure:	7 days	3-4 days	2 days

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	2.5 hours	2 hours	1 hour
Sweat-in-time:	15 minutes	10 minutes	none

Shelf Life:	Part A: 8 months, unopened Part B: 36 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C).
Flash Point:	82°F (28°C), PMCC, mixed
Reducer/Clean Up:	Xylene, R2K4
In California:	Reducer R7K111 or Oxsol 100

#### RECOMMENDED USES

For use over prepared substrates such as steel and concrete in industrial environments.

- Penstocks
- Dam gates
- Petroleum storage tanks
- Heavy duty structural coating
- Non-potable water tank and pipe coating
- Acceptable for use with cathodic protection systems
- Liner for clarifiers
- Marine applications
- Offshore drilling rigs

#### PERFORMANCE CHARACTERISTICS

Substrate\*: Steel

Surface Preparation\*: SSPC-SP6/NACE 3

System Tested\*:

1 ct. TarGuard Coal Tar Epoxy @ 10.0 mils (250 microns) dft  
\*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	137 mg loss
Adhesion	ASTM D4541	1000 psi
Direct Impact Resistance	ASTM D2794	36 in. lb.
Dry Heat Resistance (quench test only)	ASTM D2485	350°F (177°C)
Moisture Condensation Resistance	ASTM D4585, 100°F (38°C), 3000 hours	Excellent
Pencil Hardness	ASTM D3363	F
Salt Fog Resistance	ASTM B117, 3000 hours	Excellent
Thermal Shock	ASTM D2246, 100 cycles	Excellent
Wet Heat Resistance	Non-immersion	120°F (49°C)





# Protective & Marine Coatings

## TARGUARD® COAL TAR EPOXY

PART A  
PART A  
PART B

B69B60  
B69R60  
B69V60

BLACK  
RED  
HARDENER

Revised: November 3, 2014

### PRODUCT INFORMATION

4.72

#### RECOMMENDED SYSTEMS

Dry Film Thickness / ct

Mils (Microns)

Concrete, atmospheric or immersion:

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

Steel, atmospheric or immersion:

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

Aluminum, atmospheric or immersion:

Copoly Shop Primer 3.0-5.0 (75-125)

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

Galvanized steel, zinc rich primer, atmospheric only:

Zinc Clad II Plus 3.0 (75)

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

Aluminum, atmospheric only:

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

Galvanized Metal, atmospheric only:

TarGuard Coal Tar Epoxy 8.0-16.0 (200-400)

systems listed above are representative of the product's use,  
or systems may be appropriate.

#### SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel:

Atmospheric:

SSPC-SP6/NACE 3, 2 mil  
(50 micron) profile

Immersion:

SSPC-SP10/NACE 2, 3 mil  
(75 micron) profile

Aluminum:

Brush Blast, 2 mil (50 micron) profile

Galvanizing:

Brush Blast, 2 mil (50 micron) profile

Concrete & Masonry:

Atmospheric:

SSPC-SP13/NACE 6, or ICRI

No. 310.2R, CSP 1-3

Immersion:

SSPC-SP13/NACE 6-4.3.1

or 4.3.2, or ICRI No. 310.2R, CSP 1-3

#### Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	C St 2	C St 2	SP 2	-
Rusted	D St 2	D St 2	SP 2	-
Pitted & Rusted	D St 2	D St 2	SP 2	-
Rusted	C St 3	C St 3	SP 3	-
Power Tool Cleaning	D St 3	D St 3	SP 3	-
Pitted & Rusted	D St 3	D St 3	SP 3	-

#### TINTING

Do not tint.

#### APPLICATION CONDITIONS

Temperature: 50°F (10°C) minimum, 100°F (38°C) maximum  
(air, surface, and material)

Relative humidity: At least 5°F (2.8°C) above dew point  
90% maximum

Refer to product Application Bulletin for detailed application information.

#### ORDERING INFORMATION

Packaging: 5 gallons (18.9L) mixed  
Part A: 4 gallons (15.1L) in a 5 gallon (18.9L) container  
Part B: 1 gallon (3.78L)

Weight: 10.7 ± 0.2 lb/gal ; 1.3 Kg/L, mixed

#### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

#### WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

#### DISCLAIMER

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# Protective & Marine Coatings

## TARGUARD® COAL TAR EPOXY

PART A  
PART A  
PART B

B69B60  
B69R60  
B69V60

BLACK  
RED  
HARDENER

Revised: November 3, 2014

### APPLICATION BULLETIN

4.72

#### SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

##### Iron & Steel, Immersion Service:

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10 or SSPC-SP12/NACE No. 5. For SSPC-SP10, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils / 75 microns). For SSPC-SP12/NACE No. 5, all surfaces to be coated shall be cleaned in accordance with WJ-2. Pre-existing profile should be approximately 3 mils (75 microns). Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned.

##### Iron & Steel, Atmospheric Service:

Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3 or SSPC-SP12/NACE 5. For surfaces prepared by SSPC-SP6/NACE 3, first remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). For surfaces prepared by SSPC-SP12/NACE No. 5, all surfaces shall be cleaned in accordance with WJ-3. Pre-existing profile should be approximately 2 mils (50 microns). Prime any bare steel the same day as it is cleaned.

##### Galvanized Steel/Aluminum

Allow to weather a minimum of six months prior to coating. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1 (recommended solvent is VM&P Naphtha). Lightly brush blast per SSPC-SP 7 to provide a 2 mil (50 micron) profile.

##### Concrete and Masonry

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910.

##### Follow the standard methods listed below when applicable:

ASTM D4258 Standard Practice for Cleaning Concrete.  
ASTM D4259 Standard Practice for Abrading Concrete.  
ASTM D4260 Standard Practice for Etching Concrete.  
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.  
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.  
ICRI No. 310.2R Concrete Surface Preparation.

##### Concrete, Immersion Service:

For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2R, CSP 1-3.

#### Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	OC St 2	OC St 2	SP 3	-
Rusted	OC St 2	OC St 2	SP 3	-
Pitted & Rusted	OC St 3	OC St 3	SP 3	-
Rusted	OC St 3	OC St 3	SP 3	-
Power Tool Cleaning	D St 3	D St 3	SP 3	-
Pitted & Rusted	D St 3	D St 3	SP 3	-

#### APPLICATION CONDITIONS

Temperature: 50°F (10°C) minimum, 100°F (38°C) maximum  
(air, surface, and material)  
At least 5°F (2.8°C) above dew point

Relative humidity: 90% maximum

#### APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up .....Xylene, R2K4  
In California.....Reducer R7K111 or Oxsol 100

##### Airless Spray

Pressure.....3000 psi  
Hose.....3/8" - 1/2" ID  
Tip......017" - .025"  
Filter.....None  
Reduction.....As needed up to 10% by volume

##### Conventional Spray (bottom feed tank recommended)

Gun .....Binks 95  
Fluid Nozzle .....66  
Air Nozzle.....63PB  
Atomization Pressure.....60 psi  
Fluid Pressure.....40 psi  
Reduction.....As needed up to 10% by volume

##### Brush

Brush.....Small areas only; natural bristle  
Reduction.....Not recommended

##### Roller

Cover .....Small areas only; 3/8" - 1/2" woven  
with solvent resistant core  
Reduction.....Not recommended

If specific application equipment is not listed above, equivalent equipment may be substituted.





# Protective & Marine Coatings

## TARGUARD® COAL TAR EPOXY

PART A  
PART A  
PART B

B69B60  
B69R60  
B69V60

BLACK  
RED  
HARDENER

Revised: November 3, 2014

### APPLICATION BULLETIN

4.72

#### APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Contents of each component thoroughly with low speed power on. Make certain no pigment remains on the bottom of the can. Then combine four parts by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power on. Allow the material to sweat-in as indicated. Re-stir before using.

If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.

Apply paint at the recommended film thickness and spreading rate as indicated below:

#### Recommended Spreading Rate per coat:

	Minimum	Maximum
mils (microns)	11.0 (275)	22.0 (550)
mils (microns)	8.0* (200)	16.0* (400)
average sq ft/gal (m <sup>2</sup> /L)	74 (1.8)	148 (3.6)
theoretical coverage sq ft/gal	1184 (29)	
*) @ 1 mil / 25 microns dft		

See Performance Tips section

*NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.*

#### Drying Schedule @ 11.0 mils wet (275 microns):

	@ 50°F/10°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
Dry to touch:	14 hours	8-10 hours	2 hours
Recoat:			
minimum:	48 hours	18 hours	5 hours
maximum:	72 hours	72 hours	12 hours
Durability:	7 days	3-4 days	2 days
*) Minimum recoat time is exceeded, abrade surface before recoating.			
*) Drying time is temperature, humidity, and film thickness dependent.			
Life:	2.5 hours	2 hours	1 hour
Sweat-in time:	15 minutes	10 minutes	none

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

#### CLEAN UP INSTRUCTIONS

1. Spills and spatters immediately with Xylene, R2K4. Clean immediately after use with Xylene, R2K4. In California use Reducer R7K111 or Oxsol 100. Follow manufacturer's safety recommendations when using any solvent.

#### DISCLAIMER

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#### PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not apply the material beyond recommended pot life.

Do not mix previously catalyzed material with new.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Xylene, R2K4. In California use Reducer R7K111 or Oxsol 100.

Coating must be fully cured before placing into immersion service.

**For Immersion Service:** (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

Quik-Kick Epoxy Accelerator is acceptable for use. See data page 4.99 for details.

When coating over aluminum and galvanizing, recommended dft is 2-4 mils (50-100 microns).

Refer to Product Information sheet for additional performance characteristics and properties.

#### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

#### WARRANTY

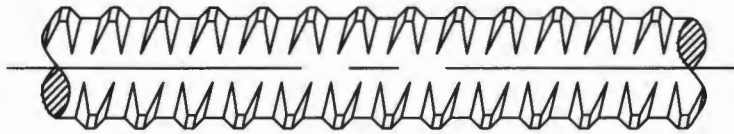
The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



## **Tie-Rod Hardware**



# LEFT HAND THREAD



## PART NUMBERS

## SPECIFICATIONS

FOR BARE BAR:

B11K CUT

ASTM A615

OR EPOXY COATED BAR:

B11K COAT

ASTM A775 OR AASHTO M284

FOR GALVANIZED BAR:

B11K GALV

ASTM A123

## PHYSICAL PROPERTIES

EFFECTIVE AREA: 1.56 SQ.IN.

ULTIMATE STRENGTH: 100 KSI

ULTIMATE LOAD: 156 KIPS

YIELD LOAD: 117 KIPS

WEIGHT: 5.313 LBS./FT.

MAX. BAR Ø INCL. RIBS: 1.61 IN.

AVERAGE CORE Ø: 1.37 IN.

PITCH: 0.709 IN.

## NOTE:

ALL DIMENSIONS APPLY TO BARE BARS ONLY.

△ → ALL PART NUMBERS CHANGED.

## DYWIDAG POST-TENSIONING SYSTEMS

36mm THREADBAR (#11) GRADE 75 KSI

## QUALITY PLAN NUMBER:

DRAWING NUMBER  
B11K00010

REV.	DATE	NAME	
1	03-17-93	K.	
2	02-22-94	K.	
3	02-27-97	A.G.	ECRN-029
4	09-12-97	A.G.	ECRN-039
5	12-10-98	A.V.	

LAST REVISION APPROVAL

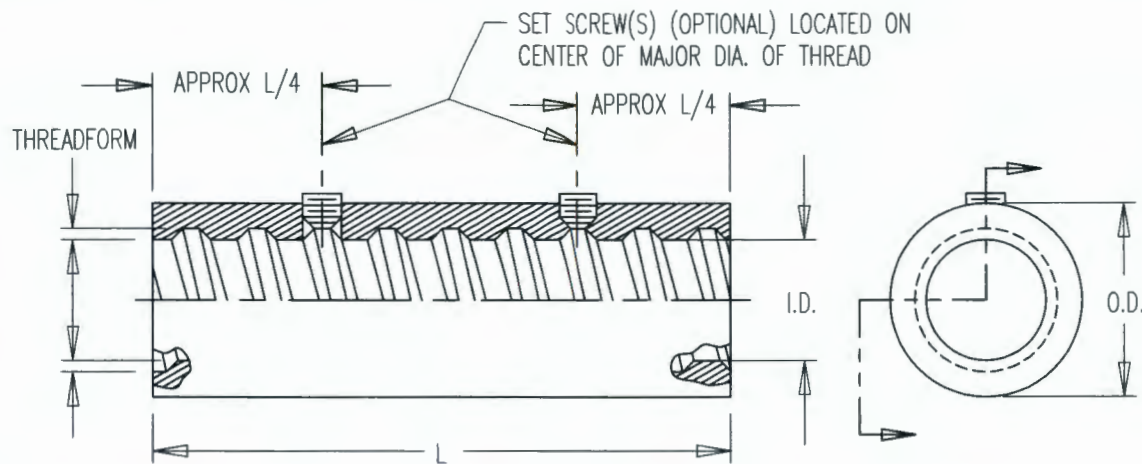
MATERIAL:  
SEE ABOVE

SCALE  
N.T.S.

DYWIDAG-SYSTEMS INTERNATIONAL, USA, INC.



8-91. DRAWN: C. MALECKI APPROVED: K. LANGENECKERT  
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n or explained for any reason to a third party other than for reasons  
ntended by the original receiver. They have to be returned on request.



COATING SPECIFICATIONS		
	EPOXY COATING	GALVANIZING
HARDWARE	ASTM A775 OR AASHTO M284	ASTM A153
THREADBAR	7-12 MIL OR ASTM A934	ASTM A123

	NOMINAL SIZE	#6	#7	#8	#9	#10	#11	#14	#18
UNCOATED * COUPLER	NO SET SCREWS	B06K70751	B07K70751	B08K70751	B09K70751	B10K70751	B11K70751	B14K70751	B18K70751
	1 SET SCREW	B06K70752	B07K70752	B08K70752	B09K70752	B10K70752	B11K70752	B14K70752	B18K70752
	2 SET SCREWS	B06K70753	B07K70753	B08K70753	B09K70753	B10K70753	B11K70753	B14K70753	B18K70753
EPOXY COATED COUPLER	NO SET SCREWS	B06K70755	B07K70755	B08K70755	B09K70755	B10K70755	B11K70755	B14K70755	B18K70755
	1 SET SCREW	B06K70754	B07K70754	B08K70754	B09K70754	B10K70754	B11K70754	B14K70754	B18K70754
	2 SET SCREWS	B06K70756	B07K70756	B08K70756	B09K70756	B10K70756	B11K70756	B14K70756	B18K70756
GALVANIZED COUPLER	NO SET SCREWS	B06K70758	B07K70758	B08K70758	B09K70758	B10K70758	B11K70758	B14K70758	B18K70758
	1 SET SCREW	B06K70757	B07K70757	B08K70757	B09K70757	B10K70757	B11K70757	B14K70757	B18K70757
	2 SET SCREWS	B06K70759	B07K70759	B08K70759	B09K70759	B10K70759	B11K70759	B14K70759	B18K70759
TOLERANCE FOR:	O.D. (IN./mm)	1.218/30,9	1.406/35,7	1.592/40,4	1.790/45,5	2.015/51,2	2.245/57,0	2.650/67,3	3.500/88,9
	I.D. (IN./mm)	.762/19,4	.888/22,6	1.006/25,6	1.128/28,7	1.268/32,2	1.436/36,5	1.693/43,0	2.275/57,8
	L (IN./mm)	3.555/90,3	4.220/107,2	4.450/113,0	5.450/138,4	5.975/151,8	6.725/170,8	8.225/208,9	9.675/245,7
	SET SCREW SIZE	1/4"-20UNC	1/4"-20UNC	1/4"-20UNC	1/4"-20UNC	1/4"-20UNC	3/8"-16UNC	3/8"-16UNC	3/8"-16UNC
	THREADFORM: 8341/	743	744	745	746	747	724	716	717
	O.D. (IN.)	±.010	±.010	±.010	±.010	±.010	±.010	±.010	±.010
	I.D. (IN.)	+0 -.006	+0 -.006	+0 -.006	+0 -.006	+0 -.006	+0 -.008	+0 -.008	+0 -.008
TOLERANCE FOR:	L (IN.)	±125	±125	±125	±125	±125	±125	±.125	±125
	WEIGHT (LBS.)	.61	.97	1.33	2.07	2.92	3.95	6.89	14.01

#### NOTES:

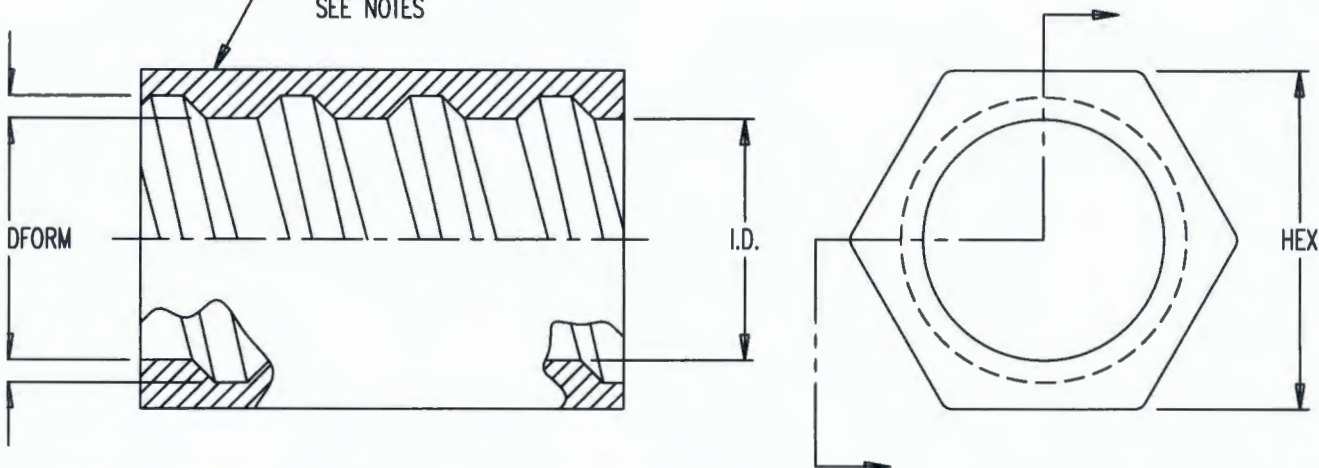
- DIMENSIONS AND TOLERANCES APPLY TO UNCOATED COUPLER.
- INTERNAL THREAD REMAINS UNCOATED.
- LEFT-HAND THREAD FOR #6, #7, #8, #9, #11 & #11. RIGHT-HAND THREAD FOR #14 & #18.
- MAXIMUM THICKNESS OF COATING ON BARS IS .012" (0.3mm).
- SET SCREW(S) INSTALLED BY MANUFACTURER.
- SET SCREWS ARE 3/8" LONG.

\* UNCOATED COUPLER USED AS RAW MATERIAL FOR COATED COUPLERS.

DIMENSIONS: INCH/mm mm FOR REFERENCE ONLY		QUALITY PLAN NUMBER: QB00030800S		REV. DATE NAME		PART NUMBER: <b>SEE TABLE</b>	
<b>FULL LOAD COUPLERS FOR COATED GRADE 75 THREADBAR</b>				MATERIAL: SEE ABOVE & PMK0070790T		SCALE NTS	
DATE: 09-05-96 DWG: G. MALECKI CHK: S.Y. APP: K.S.				REV. DATE NAME		DRAWING NUMBER: <b>B00K70750</b>	
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				DSI			



ALL OUTSIDE SURFACES  
COATED AS REQUIRED  
SEE NOTES



NOMINAL SIZE	#6	#7	#8	#9	#10	#11
PART NUMBERS FOR:						
UNCOATED NUT *	B06K40451	B07K40451	B08K40451	B09K40451	B10K40451	B11K40451
EPOXY COATED NUT	B06K40455	B07K40455	B08K40455	B09K40455	B10K40455	B11K40455
GALVANIZED NUT	B06K40458	B07K40458	B08K40458	B09K40458	B10K40458	B11K40458
HEX (IN./mm)	1.160/29,5	1.340/34,0	1.515/38,5	1.705/43,3	1.920/48,8	2.140/54,4
I.D. (IN./mm)	.762/19,4	.888/22,6	1.006/25,6	1.128/28,7	1.268/32,2	1.436/36,5
L (IN./mm)	1.640/41,7	1.955/49,7	2.043/51,9	2.510/63,8	2.700/68,6	3.075/78,1
THREADFORM: 8341/	743	744	745	746	747	724
TOLERANCE FOR:						
HEX (IN.)	±.010	±.010	±.010	±.010	±.010	±.010
I.D. (IN.)	+0 -.006	+0 -.006	+0 -.006	+0 -.006	+0 -.006	+0 -.008
L (IN.)	±.125	±.125	±.125	±.125	±.125	±.125
WEIGHT (LBS.)	.28	.45	.61	.95	1.32	1.81

NOMINAL SIZE	#14	#18
PART NUMBERS FOR:		
UNCOATED NUT *	B14K40451	B18K40451
EPOXY COATED NUT	B14K40455	B18K40455
GALVANIZED NUT	B14K40458	B18K40458
HEX (IN./mm)	2.520/64,0	3.340/84,8
I.D. (IN./mm)	1.693/43,0	2.275/57,8
L (IN./mm)	3.750/95,3	4.405/111,9
THREADFORM: 8341/	716	717
TOLERANCE FOR:		
HEX (IN.)	±.010	±.010
I.D. (IN.)	+0 -.008	+0 -.008
L (IN.)	±.125	±.125
WEIGHT (LBS.)	3.12	6.43

COATING SPECIFICATIONS		
	EPOXY COATING	GALVANIZING
HARDWARE	ASTM A775 OR AASHTO M284 7-12 MIL OR ASTM A934	ASTM A153
THREADBAR		ASTM A123

#### NOTES:

- DIMENSIONS AND TOLERANCES APPLY TO UNCOATED HEX NUT.
- INTERNAL THREAD REMAINS UNCOATED.
- LEFT-HAND THREAD FOR #6, #7, #8, #9, #10 & #11  
RIGHT-HAND THREAD FOR #14 & #18  
(RIGHT-HAND FOR #7 MAY BE AVAILABLE, P/N B07K404--).
- I.D. DEVIATES FROM STANDARD THREADFORM DRAWING.
- MAXIMUM THICKNESS OF COATING ON BARS IS 0.012" (0.3mm).



UNCOATED NUT USED AS RAW MATERIAL  
FOR COATED NUTS.

DIMENSIONS: INCH/mm  
n FOR REFERENCE ONLY

QUALITY PLAN NUMBER:  
QB00020700S

**NUTS FOR COATED GRADE 75 THREADBAR  
-FULL LOAD-**

1-10-07 DWG: G. MALECKI CHK: S.Y. APP: K.S.

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OTHER THAN FOR REASONS EXPRESSLY INTENDED BY DSI'S SUBMITTAL TO  
GINAL RECEIVER. THEY HAVE TO BE RETURNED UPON REQUEST.

REV.	DATE	NAME	PART NUMBER:
2	07-18-97	A.G.	PB-088
3	09-10-97	A.G.	ECRN-039
4	12-14-98	A.W.	
5	11-18-05	C.S.	
6	01-10-07	S.Y.	
7	11-08-07	S.Y.	
8	04-20-09	S.Y.	

MATERIAL:  
SEE ABOVE  
& PMK0070790T

SCALE  
NTS

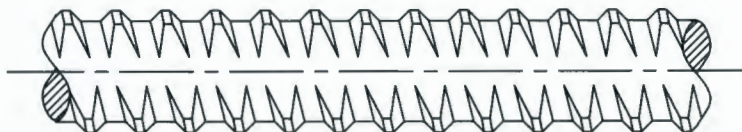
DRAWING NUMBER:  
**B00K40450**

DYWIDAG-SYSTEMS INTERNATIONAL, USA, INC.  
320 MARION DRIVE - BOLINGBROOK, IL 60440  
PHONE: 630-739-1100 FAX: 630-739-1405





# RIGHT HAND THREAD



	PART NUMBERS	SPECIFICATIONS
FOR BARE BAR:	B18W CUT	ASTM A615
FOR EPOXY COATED BAR:	B18W COAT	ASTM A775 OR AASHTO M284
FOR GALVANIZED BAR:	B18W GALV	ASTM A123

## PHYSICAL PROPERTIES

EFFECTIVE AREA:	4.00 SQ.IN.
ULTIMATE STRENGTH:	105 KSI
ULTIMATE LOAD:	420 KIPS
YIELD STRENGTH:	80 KIPS
YIELD LOAD:	320 KIPS
WEIGHT:	13.60 LBS./FT.
MAX. BAR Ø INCL. RIBS:	2.50 IN.
AVERAGE CORE Ø:	2.19 IN.
PITCH:	1.173 IN.

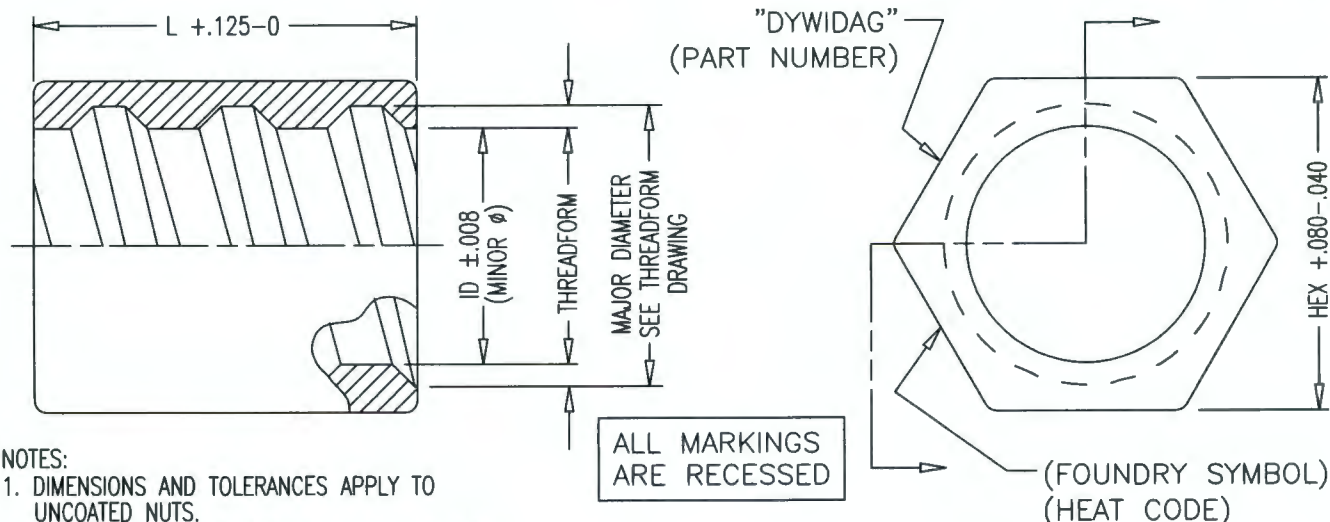
## NOTE:

ALL DIMENSIONS APPLY TO BARE BARS ONLY.

QUALITY PLAN NUMBER: QB00000010B & QB00000050B				REV.	DATE	NAME		PART NUMBER:
<b>57mm THREADBAR (#18) GRADE 80 KSI</b>		MATERIAL: SEE ABOVE	SCALE NTS					<b>B18W CUT</b>
								<b>B18W COAT</b>
								<b>B18W GALV</b>
DATE: 06-03-14	DWG: G. MALECKI	CHK: S.Y.	APP: K.S.					DRAWING NUMBER:
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# NOTES:

1. DIMENSIONS AND TOLERANCES APPLY TO UNCOATED NUTS.
2. THREADFORM AND ID (MINOR Ø) AS SPECIFIED IN TABLE.
3. AT BOTH ENDS OF NUT THREADFORM IS MODIFIED OVER LAST 1/2 TURN AS FOLLOWS: MINOR Ø OPENS UP TO MAJOR Ø AT CONSTANT RADIUS.
4. #6 THRU #11 & #20 (63mm) NUTS HAVE LEFT-HANDED THREADS; #14 AND #18 NUTS HAVE RIGHT-HANDED THREADS.
5. MAXIMUM ALLOWED SURFACE VOIDS "A3" & "C2" PER MATERIAL SPEC. PM00025320C.
6. INTERNAL THREAD REMAINS UNCOATED.
7. I.D. DEVIATES FROM STANDARD THREADFORM DRAWING.
8. MAXIMUM THICKNESS OF COATING ON BARS IS 0.012" (0.3mm).

COATING SPECIFICATIONS		
	EPOXY COATING	GALVANIZING
HARDWARE	ASTM A775 OR AASHTO M284 7-12 MIL OR ASTM A934	ASTM A153
THREADBAR		ASTM A123

NOMINAL SIZE					
PART NUMBERS FOR:					
UNCOATED NUT					
EPOXY COATED NUT					
GALVANIZED NUT					
HEX (IN./mm)					
I.D. NOM. (IN./mm)					
L (IN./mm)					
THREADFORM: 8341/					
WEIGHT (LBS.)					

NOMINAL SIZE	#11	#14	#18	
PART NUMBERS FOR:				
UNCOATED NUT	B11W27851	B14W27851	B18W27851	
EPOXY COATED NUT	B11W27855	B14W27855	B18W27855	
GALVANIZED NUT	B11W27858	B14W27858	B18W27858	
HEX (IN./mm)	2.140/54.4	2.500/64.0	3.130/79.5	
I.D. NOM. (IN./mm)	1.436/36.5	1.684/42.8	2.262/57.5	
L (IN./mm)	2.600/6.6	3.000/76.2	3.750/95.3	
THREADFORM: 8341/	724D	716D	717D	
WEIGHT (LBS.)	1.73	2.78	4.74	

BARE AND EPOXY COATED NUTS ARE FULL LOAD NUTS; GALVANIZED NUTS ARE ONLY GOOD FOR 110% OF BAR YIELD LOAD



DIMENSIONS: INCH/mm mm FOR REFERENCE ONLY		QUALITY PLAN NUMBER: QBU0027701C		REV. DATE NAME ECRN		PART NUMBER:	
<b>CAST HEX NUTS FOR COATED BAR GRADE 80</b>				1 09-30-15 S.Y. 0312		<b>SEE TABLE</b>	
				2 10-15-15 S.Y. 0313			
DATE: 06-23-14 DWG: G. MALECKI CHK: S.Y. APP: S.E.				MATERIAL: SEE MATERIAL SPEC. DRAWING PMU0028800C & PM00025320C		DRAWING NUMBER: <b>B00W27850</b>	
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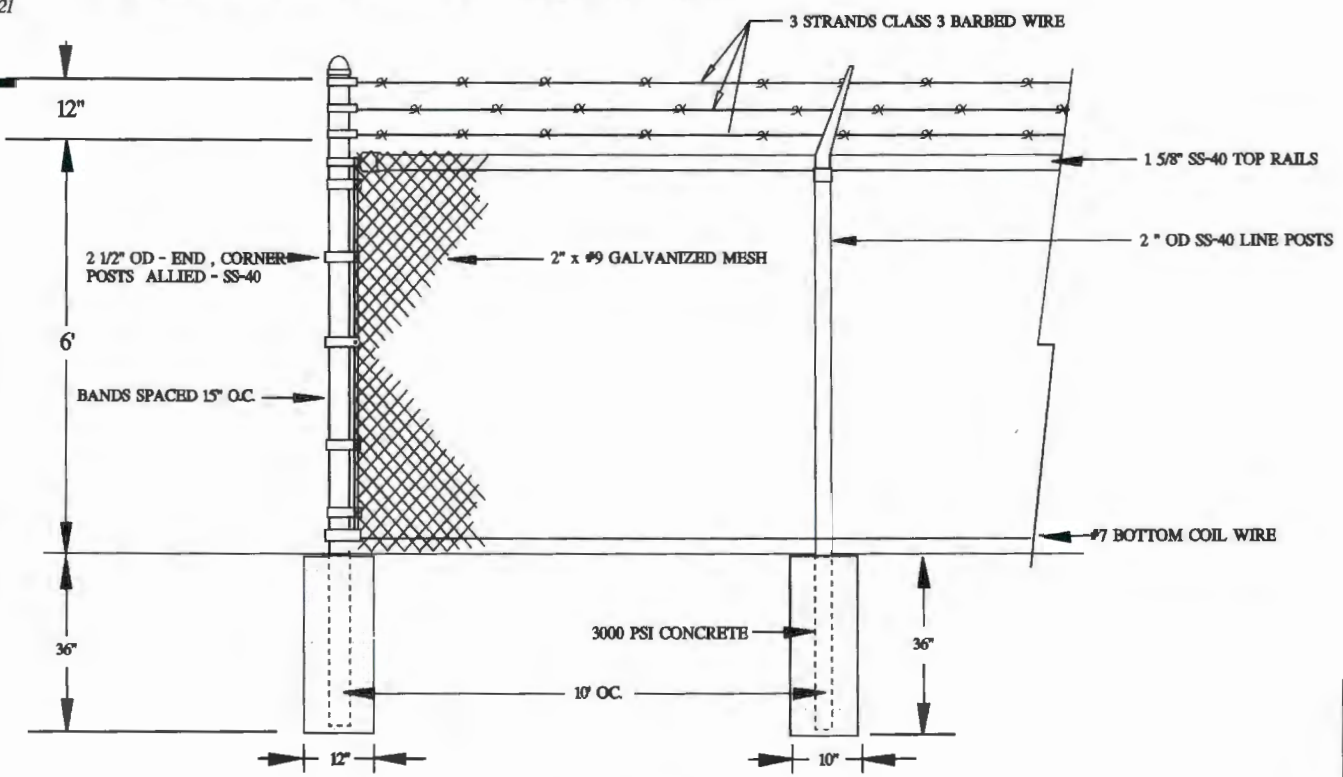




# Chain Link Fence

**APEX SERVICES INC.**  
 917 RAY AVENUE CROYDON, PA. 19021  
 PH: 215-552-9921 FAX: 215-552-9961  
 EMAIL: apexservice@comcast.net

**6'± GALVANIZED CHAIN LINK FENCE**



ALL PIPE TO BE SS #40  
 ASTM F669 GRADE B

APEX SERVICES, INC	
6'± CHAIN LINK FENCE	
SCALE: NONE	<b>6CLF</b>
DRAWN BY: G.H.	
DATE: 7/14/15	

# SS40<sup>®</sup>



SS 40  
MADE IN U.S.A.

 **allied**  
TUBE & CONDUIT  
FENCE DIVISION  
A tyco INTERNATIONAL LTD. COMPANY



# SS40®

Allied Tube & Conduit, with an engineering breakthrough in pipe manufacturing and corrosion resistant coating, has developed the most specified and the most requested framework in the fencing industry.

**SS-40** is manufactured with cold-formed steel which provides a high yield/tensile strength, followed by a uniform triple layer of corrosion protection. The coating consists of zinc, chromate, and a clear organic top coat applied in-line by Allied's patented continuous Flo-Coat® process.

The high yield strength steel and the triple coat of *locked-in* protection, results in pipe that not only out-performs Schedule 40 pipe in strength and corrosion resistance, but maintains its lustrous appearance in all climates and under the most severe atmospheric conditions. **SS-40** is clearly the industry leader.

## Technical Specifications

### 1. Scope

This specification covers galvanized steel fence pipe as manufactured by the Allied Tube & Conduit patented Flo-Coat process.

### 2. Materials

#### 2.1 Steel

Steel strip used in the manufacture of pipe shall conform to ASTM A 569 and will meet all performance criteria set forth in this standard/specification.

#### 2.2 Zinc

Zinc used in Allied's Flo-Coat process conforms to ASTM B 6 High Grade and Special High Grade Zinc.

#### 2.3 Chromate

The chromate conversion coating is applied over the surface of the zinc to enhance corrosion resistance.

#### 2.4 Organic Clear Coating

Organic clear coating, applied over the chromate conversion coating, is manufactured from high grade raw materials.

### 2.5 Internal Coating

The internal zinc-rich based coating shall have a minimum zinc powder loading of 90% by weight and have the capability of producing galvanic protection.

### 3. Weight of Coatings

#### 3.1 Zinc

Weight of zinc shall be 1.0 oz./ft.<sup>2</sup> ± 0.1 oz./ft.<sup>2</sup> and shall be determined by the method described in ASTM A 90.

#### 3.2 Chromate Conversion Coating

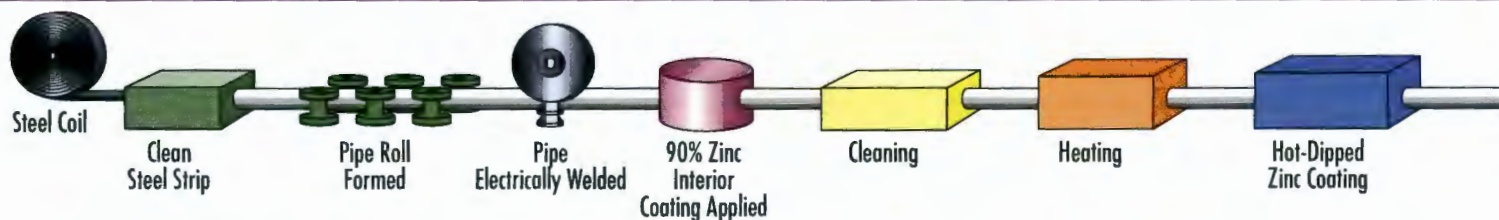
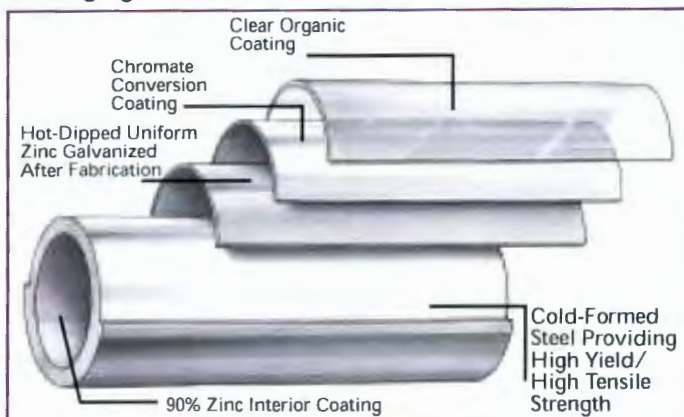
Chromate coating shall be 30 micrograms/in.<sup>2</sup> ± 15 micrograms/in.<sup>2</sup> and shall be determined by a strip and weigh method utilizing an atomic absorption spectrophotometer or X-Ray fluorescence spectrograph.

#### 3.3 Organic Clear Coating

Thickness of the clear coating shall be a nominal .5 mils ± .2 mils and shall be determined by measurement with a suitable magnetic or eddy current coating thickness tester. Thickness of clear coating is determined by taking the difference between the thickness

of zinc and the total thickness of the clear coating and zinc.

The thickness tester shall be standardized on the steel surface after removing the zinc prior to making measurements.





## Strength Characteristics

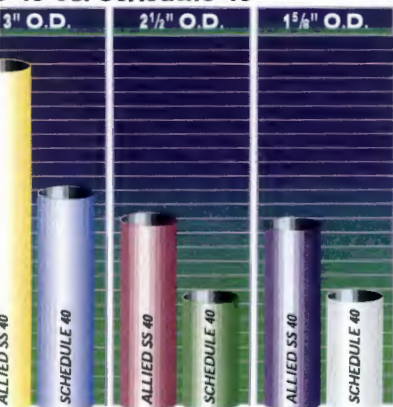
### Bending Strength

The strength of line, end, corner, and pull posts shall be determined by the use of 4 foot or 10 foot cantilevered beam test. The top rail shall be determined by a 10 foot free-supported beam test (see Table 1).

### Bending Moment

An alternative method of determining pipe strength is by the calculation of bending moment (see Table 1). Conformance with this specification can be demonstrated by measuring the yield/tensile strength of a randomly selected piece of pipe from each lot and calculating the section modulus. The yield/tensile strength shall be determined according to the methods described in ASTM E 8. For materials under this specification, the 0.2 offset method shall be used in determining yield strength.

### Bending Strength Comparison SS-40 vs. Schedule 40



Results are based on 6 foot Cantilevered beam and 10 foot free-supported beam test.

## 5. Corrosion Resistance

### 5.1 Salt Spray

**a. Exterior Surface.** The exterior clear coated surface of the pipe shall have a demonstrated ability to resist 1000 hours of exposure to salt fog with a maximum of 5% red rust when conducted in accordance with ASTM B 117.

**b. Interior Surface.** The interior zinc rich coated surface shall have a demonstrated ability to withstand 650 hours of exposure to salt fog with a maximum of 5% red rust when conducted in accordance with ASTM B 117.

### 5.2 Humidity

**a. Exterior Surface.** The clear coated exterior surface of the pipe shall have a demonstrated ability to resist 500 hours of exposure to 100% relative humidity without blistering and peeling when conducted in accordance with ASTM D 4585. (D 2247).

### 5.3 Weatherometer

**a. Exterior Surface.** The clear exterior coating shall have a demonstrated ability to withstand exposure for 500 hours without failure at a black panel temperature of 145 F. (63 C.) when tested in accordance with ASTM G 26, Xenon Type BH apparatus, or ASTM G 23 (Carbon Arc) Type HH apparatus.

## Performance

For nearly forty years, **SS-40** has disproven the common belief that greater weight equals greater strength. **SS-40** is 20% lighter than Schedule 40 in gauge and weight, yet is as much as 33% stronger.

The superior strength of **SS-40** is attributable to two key factors:

1. Cold rolled steel with a minimum of 50,000 psi yield strength.
2. The tempering effect of cold water quenching following the hot-dip galvanizing.

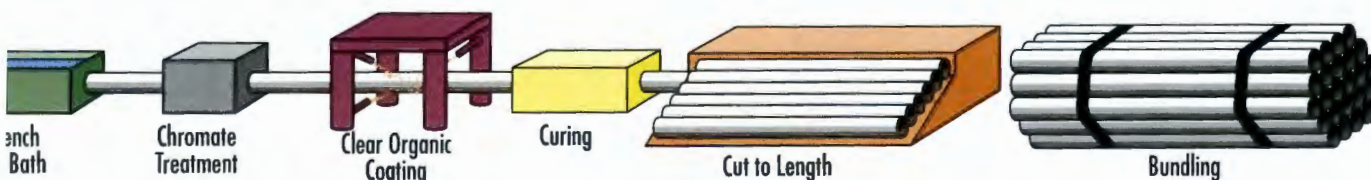
Exceptional corrosion resistance is achieved through Allied's patented Flo-Coat process. A uniform layer of zinc is applied, followed by total immersion in chromate, and finally a clear organic top coat. The triple coating minimizes oxidation and locks-in the corrosion protection to preserve a "like new" appearance.

It is the combination of zinc, chromate and clear organic top coat, that produces a "**synergistic**" effect which results in greater corrosion resistance than the sum of the individual coatings.

The triple coating, uniformly applied during the Flo-Coat process, gives **SS-40** a highly lustrous appearance that will fabricate without flaking and remain maintenance-free. When performance is the **only true criterion**, **SS-40** is the obvious choice.

## Availability

**SS-40** is manufactured by Allied Tube & Conduit in Harvey, IL and Philadelphia, PA. A full inventory of standard lengths is maintained at both locations to insure fast delivery and to meet even the strictest schedules. If special lengths are required, ask about Allied's cut-to-length capabilities. Made-to-order lengths will help reduce fabrication time, eliminate wasteful drops and additional handling costs. Our nationwide distribution network and coast-to-coast shipping system helps Allied retain its position as **Number One Supplier** to the fence industry.





## Certification

"Made in U.S.A." is proudly displayed on every length of **SS-40** pipe. Allied will certify that all **SS-40** fence pipe is manufactured in the USA and is in compliance with applicable Federal, State and local specifications.

## Specifying Agencies

Partial list of agencies which have approved **SS-40**.

- (AASHTO) American Associations of State Highway and Transportation Officials M181-93
- Federal Specifications RR-F-191/2D (Chain Link Fence Gates)
- Federal Specifications RR-F-191/3D (Chain Link Fence Posts, Top Rails and Braces)
- Corps of Engineers CEGS-02831
- Department of the Navy NFGS-02831
- Department of Transportation Federal Aeronautics Administration AC 150/5370-10A Item F-162
- U.S. Department of Justice - Federal Bureau of Prisons
- ASTM Specification F1043-95 Standard Specification for Strength and Protective Coatings
- American Institute of Architects (AIA) MASTERSPEC

Call our Toll-free number for assistance.

**1-800-882-5543**

Visit our website at  
[www.alliedtube.com](http://www.alliedtube.com)

**Table 1**

## Physical Dimensions and Strength Calculations

### SS-40 Pipe Sizes

Fence Industry O.D.	Decimal O.D. Equivalent		Pipe Wall Thickness		Weight		Section Modulus inches <sup>3</sup>	Min. Yield Strength psi	Max Bending = Moment lb. in.	Calculated Load (lbs.)		
	inches	(mm)	inches	(mm)	lb./ft.	(kg/m)				10' Free Supported	Cantilever	
1-3/8"	1.315	33.40	.104	2.64	1.35	2.01	.1111	x 50,000	= 5555	185	116	77
1-5/8"	1.660	42.16	.111	2.82	1.84	2.74	.1961	x 50,000	= 9805	327	204	136
2"	1.900	48.26	.120	3.05	2.28	3.39	.2810	x 50,000	= 14050	468	293	195
2-1/2"	2.375	60.33	.130	3.30	3.12	4.64	.4881	x 50,000	= 24405	814	508	339
3"	2.875	73.03	.160	4.06	4.64	6.90	.8778	x 50,000	= 43890	1463	914	610
3-1/2"	3.500	88.90	.160	4.06	5.71	8.50	1.3408	x 50,000	= 67040	2235	1397	931
4"	4.000	101.60	.160	4.06	6.56	9.76	1.7819	x 50,000	= 89095	2970	1856	1237

Specifications, descriptions, and illustrated material are accurate as known at time of publication and are subject to change without notice.

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MEMBER



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TUBE & CONDUIT  
FENCE DIVISION

16100 South Lathrop Ave  
Harvey, Illinois 60426  
(708) 339-1610  
FAX (708) 339-2373



02830/GAL  
Buyline 7515

**Pound for pound,  
Galvanized After Weave fabric (GAW)  
is the best value in chain link fencing.**



**Nothing beats the complete zinc coating  
of GAW chain link fabric in durability  
and rust-prevention.**



# Ask for GAW Everytime

GAW Chain Link Fence Fabric provides exceptional security and protection in commercial, industrial, institutional, recreational and residential fencing applications. GAW also provides the best protection against corrosion in even the most severe coastal industrial environments. Hot dip zinc galvanizing is a simple process with over 200 years of proven effectiveness in millions of applications worldwide.

There are other zinc galvanizing processes and other metallic coatings. None surpass GAW in durability and protection. It's a premium product providing superior corrosion—and rust-resistance that doesn't cost a premium price.

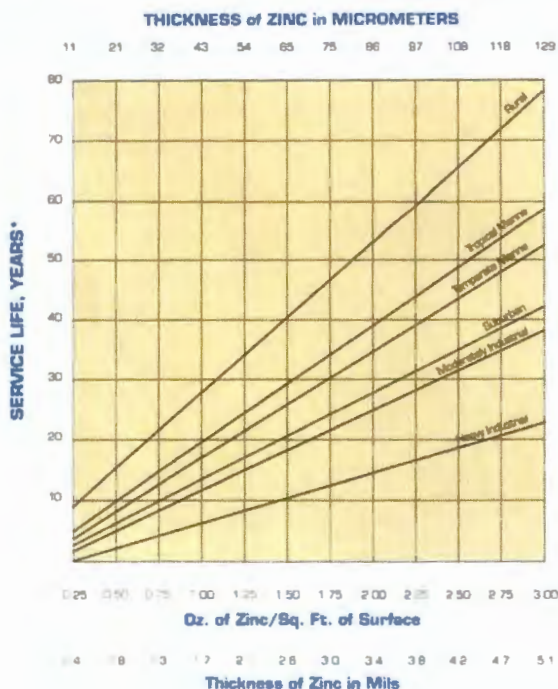
## The Importance of GAW

GAW fabric is the only chain link fabric that's coated after weaving, ensuring that all surfaces of the base metal are protected. With GAW coatings, you have complete protection against rust and corrosion and an additional after coating treatment is applied to prevent white rust and early deterioration.

With any pre-coated wire, the weaving process leaves the twist and knuckle tips bare from trimming. Cut ends may be dipped in other materials, but they are no substitute in protection for the thorough zinc coating of the GAW process.

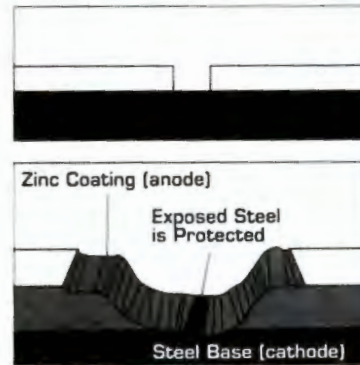
## The Durability of GAW

Fabric galvanized after weaving is manufactured to the demanding requirements of ASTM specification A 392, which offers two classes of coating: Class 1—1.2 ounces (366 g/m<sup>2</sup>) of zinc coating per sq. ft.; and Class 2—2.0 ounces (610 g/m<sup>2</sup>) of zinc coating per sq. ft. The effective service life of a fabric is directly related to the coating thickness—the thicker the coating, the longer the life. A Class 2 GAW coating is unsurpassed among metallic chain link fence coatings in providing long-term barrier and cathodic protection. That's a value you can measure.



\* Service Life is defined as the time to 5% rusting of the steel surface

Chart used with permission of the American Galvanizers Association.



This is what happens to a scratch on galvanized steel. The zinc coating sacrifices itself slowly by galvanic action to protect the base steel. This sacrificial action continues as long as any zinc remains in the immediate area.

## The "Self-Healing" of GAW

All zinc coatings have "self-healing," or cathodic properties which protect exposed core metal. Even after years of wear, the remaining zinc stays active. Of all metals used for protective coating of steel, zinc is the most electrochemically active, in all environments, from mild rural to harsh marine and heavy industrial.

In other words, zinc provides a far superior coating in both barrier and cathodic protection...and GAW fabric provides the best of both.



## The Finish of GAW

Committed to their product, GAW producers assure you of chain link fabric with a complete coating. A continuous vertical dip and retrieval process removes excess zinc and keeps joints from welding.

## The Value of GAW

When specifying chain link fabric, insist on GAW produced in accordance with ASTM A 392. If you're looking for durability and rust-prevention, there's no better chain link fencing than GAW. Fewer long-term maintenance problems mean lower long-term costs and greater life-cycle savings. Pound for pound, GAW fabric is by far your best value.



# GAW Benefits

02830/GAL  
Buyline 7515

- 1. Zinc-based process offers the most active cathodic protection
- 2. Heavier and more thorough coating with no flaking or bare trim ends
- 3. Additional protective coating to prevent white rust
- 4. All components of GAW fence systems are zinc coated
- 5. Consistently meets ASTM specifications
- 6. Established manufacturers produce consistent quality
- 7. Proven technology for 200 years
- 8. National availability, with warranties from many manufacturers
- 9. Lower long-term costs
- 10. Fewer long-term maintenance problems



*Left: Precoated fabric with uncoated tips. With pre-coated fabric some manufacturers coat the bare cut-ends, but many don't. No one coats the ends with the same material that protects the rest of the fabric.*



*Right: GAW fabric. The GAW process guarantees that cut ends will be coated with the same quality material and protection as the rest of the fabric. The pre-coated process provides no such guarantee.*

## GAW Chain Link Fencing! A popular choice of landscape architects.

GAW Chain Link Fencing is resistant to defacement and offers total visibility. But when combined with landscaping, chain link provides an attractive visual barrier while maintaining security.





## SPECIFICATIONS

### 1. Description of Terms

**1.1 Chain Link Fence Fabric**—A fencing material from steel wire helically wound and interwoven in such a manner as to provide a continuous mesh without knots or ties except in the form of knuckling or of twisting the ends of the wires to form the selvage of the fabric.

**1.2 Knuckling**—This term is used to describe the type of selvage obtained by interlocking adjacent pairs of wire ends and then bending the wire ends back into a closed loop.

**1.3 Twisting**—The term is used to describe the type of selvage obtained by twisting adjacent pairs of wire ends together in a closed helix of 1-1/2 machine turns, which is equivalent to three full twists, and cutting the wire ends at a sharp angle to provide sharp points. The wire ends beyond the twist shall be at least 1/4 inch (6.4 mm) long.

**1.4 Diamond Count**—A term used to designate the number of mesh openings in each height of fabric.

### 2. Requirements

#### 2.1 Materials

**2.1.1** The base metal from which the wire for the fabric is drawn shall be good commercial steel rod.

**2.1.2 Zinc Coating**—Applied by the hot dipped process after weaving, the zinc coating on the fabric may be ordered in two coating weight classes, as Class 1—the weight of zinc coating shall not be less than 1.2 oz./ft.<sup>2</sup> (354 g/m<sup>2</sup>) of uncoated wire surface; or Class 2—the weight of zinc coating shall not be less than 2 oz./ft.<sup>2</sup> (590 g/m<sup>2</sup>) of uncoated wire surface as determined from the average of results of two or more specimens, and not less than 1.8 oz./ft.<sup>2</sup> (549 g/m<sup>2</sup>) of uncoated wire surface for any individual specimen. Fabric is normally not produced with a Class 2 coating on 11 ga. (120") (3 mm) or 11 1/2 ga. (.113") (2.9 mm) wire. The weight of the zinc coatings shall be determined in accordance with 3.2. The zinc used for the coating shall conform to the grades specified in ASTM Designation B6, Standard Specification for Slab Zinc.

**2.2 Fabric Sizes**—The height, diamond count, size of mesh, and wire diameters of chain link fabric shall be as given in the Table. The methods of measurement and tolerances are given in 2.2.1., 2.2.2 and 2.2.3.

**2.2.1 Height of Fabric**—The height of the fabric shall be the overall dimension from ends of twists or knuckles. The tolerance of the nominal height shall be plus or minus one inch (25.4 mm).

**2.2.2 Mesh Sizes**—The size of mesh shall conform to the requirements as shown in the Table. The permissible variation from the specified size of mesh shall be  $\pm 1/8$  in. (3.2 mm) for all mesh sizes over 1 in. (25.4 mm) and  $\pm 1/16$  in. (1.6 mm) for all mesh sizes 1 in. (25.4 mm) and under.

**2.2.3 Wire Diameter**—The diameter of the coated wire shall be determined as the average of two readings measured to the nearest 0.001 inch (.03 mm) taken at right angles to each other on the straight portion of the parallel sides of the mesh. The tolerance in the diameter of the coated wire shall be plus or minus 0.005 inch (.13 mm).

**2.3 Selvage**—Fabric with 2 inch (50.8 mm) or 2-1/4 inch (57.2 mm) mesh, in heights less than 72 inches (1830 mm) shall be knuckled at both selvages. Fabric 72 inches (1830 mm) high and over shall be knuckled at one selvage and twisted at the other. These are the standard selvages. Other selvage combinations will be supplied only if specified by the purchaser.

Caution: Twisted selvages for fences under 72 inches (1830 mm) in height are not recommended because of consumer safety considerations.

The selvages of fabrics with meshes of less than 2 inches (50.8 mm) shall be knuckled on both edges.

**2.4 Workmanship**—Chain link fence fabric shall be produced by methods recognized as good commercial practice. The metallic coating shall be applied in a continuous process and shall not be applied to the fabric in roll form.

### 3. Test

**3.1 Breaking Strength**—See the Table—The break strength of the fabric shall be determined in accordance with the method described in ASTM A370, using one specimen from each sample roll. Specimens to establish conformance to this requirement shall constitute individual pickets from a section of the fence fabric of a sufficient length so as to measure 15-18 inches (381 mm-457 mm) after straightening. The straightened portion of the specimen shall be inside the jaws of the tensile testing machine so that the actual test is performed on the underformed section between the jaws. If fracture takes place, other than between the grips, the test shall be discarded.

**3.2 Weight of Zinc Coating**—The weight of zinc coating on the fabric shall be determined in accordance with the method described in ASTM Designation A90, using one piece of wire removed from the fabric of each sample roll.

**Fabric Size Table**

Recommended Usage	Height of Fabric										Size of Mesh	Gage, Coated Wire	Nominal Diameter Coated Wire	Minimum Breaking Strength lb. (N)
Heavy Industrial	36" (914 mm)	42" (1067 mm)	48" (1219 mm)	60" (1524 mm)	72" (1829 mm)	84" (2134 mm)	96" (2438 mm)	120" (3048 mm)	144" (3658 mm)		2" (50.8 mm)	6	0.192" (4.9 mm)	2170 (9700)
Diamond Count	10	12	13	17	20	24	27	34	41					
Standard Industrial	36" (914 mm)	42" (1067 mm)	48" (1219 mm)	60" (1524 mm)	72" (1829 mm)	84" (2134 mm)	96" (2438 mm)	120" (3048 mm)	144" (3658 mm)		2" (50.8 mm)	9	0.148" (3.7 mm)	1280 (5700)
Heavy Industrial	10	12	13	17	20	24	27	34	41					
Light Industrial	36" (914 mm)	42" (1067 mm)	48" (1219 mm)	60" (1524 mm)	72" (1829 mm)	84" (2134 mm)					2" (50.8 mm)	11	0.128" (3.3 mm)	850 (3800)
Standard Residential	10	12	14	17	20	24								
Light Residential	36" (914 mm)	42" (1067 mm)	48" (1219 mm)	60" (1524 mm)							2 1/2" (63.5 mm)	11	0.113" (2.9 mm)	750 (3300)
Residential	9	11	13	16										
Tennis Court	120" (3048 mm)	144" (3658 mm)									3" (76.2 mm)	11	0.128" (3.3 mm)	850 (3800)
Diamond Count	39	47												

## Specifying Information

Height	Mesh Size	Gage Coated Wire	Selvage	ASTM A392 Class of Coating	Process
Sample 72"	2	9	KT	Class 2	Galv. after weaving

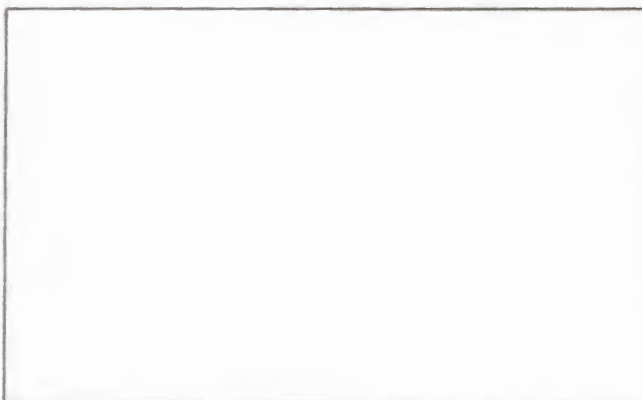
Galv. after weaving

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# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

iron International Corporation

Custom House Street

ton, MA 02110

DATE: 4/15/16

JOB NO.: 16-0463

ATTENTION: Nicholas Steenhaut

RE: Metal Bank NPL Site

SENDING YOU



Attached



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Shop Drawings



Prints



Plans



Samples



Specifications

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Change order



DATE	PAGES	DESCRIPTION
4/15/2016	4	Submittal #7.2 Water Repair Sequence and Procedures

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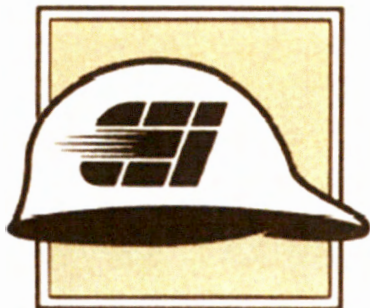
SIGNED:

*Meghan Murphy*

Meghan Murphy

Project Coordinator





# CREAMER ENVIRONMENTAL, INC.

REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Waler Repair Sequence and Procedures**

Creamer Environmental, Inc. (CEI) will procure the epoxy coated steel materials following the approval of material sources and field verification of existing materials. CEI will access the waler repair from the 5' wide rip rap platform installed within Zone 2. The waler repair requires the removal of the existing double channel waler to the limits shown on the plans and the installation of a new pair of channels. Once the Union dock builders are assigned to the project their welder qualifications and/or certifications will be provided. The new channels will be welded into place as shown on the details, using full penetration welds on the ends and at the corner to connect the double channel as a continuous waler. The complete joint penetration welds will be completed as per the American Welding Society's Welding Procedure Specification (WPS) for a Single Groove Weld as documented on the attached WPS Form. These walers will be held in place with the existing plates on the tie-rods as well as the new HP support brackets to be installed as per plan.

The support brackets are installed to help hold the added weight of the channel system at the corner. Four segments of HP8 waler will be installed in front of the double channel waler where it has been repaired as well as with a segment north and south of the repair section. New HP8 walers will be discontinuous at tie-rod locations, T-23 through T-25, in accordance with the attached plan. In order to allow for the waler to drain, 1" diameter holes will be installed 10' on center through the web of the waler.

The walers and beams to be delivered to the site will be coated with a minimum of 16 mil epoxy to maintain the corrosion protection. All locations where welding is to occur will be cleaned such that a proper weld can be performed. The welding will damage the coating in the area of the weld, and the exposed surfaces will need to be recoated. The exposed areas where the coating has been removed or damaged will be cleaned and coated using field touch up kits that are compatible with the coating on the existing sheeting.



**WELDING PROCEDURE SPECIFICATION (WPS) Yes ☒**  
**PREQUALIFIED \_\_\_\_\_ QUALIFIED BY TESTING \_\_\_\_\_**  
**or PROCEDURE QUALIFICATION RECORDS (PQR) Yes ☐**

Company Name Creamer Environmental, Inc.  
 Welding Process(es) SMAW  
 Supporting PQR No.(s) B-U2a

Identification # \_\_\_\_\_  
 Revision \_\_\_\_\_ Date \_\_\_\_\_ By \_\_\_\_\_  
 Authorized by \_\_\_\_\_ Date \_\_\_\_\_  
 Type—Manual ☐ Semiautomatic ☐  
 Mechanized ☐ Automatic ☐

**JOINT DESIGN USED**Type: Single V GrooveAngle ☒ Double Weld ☐Backing: Yes ☒ No ☐A572 GR 50

Backing Material:

Not Opening 1/4" Root Face Dimension \_\_\_\_\_Groove Angle: 45 Radius (J-U) \_\_\_\_\_Back Gouging: Yes ☐ No ☒ Method \_\_\_\_\_**BASE METALS**Material Spec. A572Type or Grade 50Thickness: Groove 5/8" Fillet \_\_\_\_\_

Diameter (Pipe) \_\_\_\_\_

**FILLER METALS**AWS Specification A5.1AWS Classification E7018**SHIELDING**

Flux \_\_\_\_\_ Gas \_\_\_\_\_

Electrode-Flux (Class) \_\_\_\_\_ Composition \_\_\_\_\_

Flow Rate \_\_\_\_\_

Gas Cup Size \_\_\_\_\_

**PREHEAT**

Preheat Temp., Min. \_\_\_\_\_

Interpass Temp., Min. \_\_\_\_\_ Max. \_\_\_\_\_

**POSITION**

Position of Groove: \_\_\_\_\_ Fillet: \_\_\_\_\_

Vertical Progression: Up ☐ Down ☐**ELECTRICAL CHARACTERISTICS**Transfer Mode (GMAW) \_\_\_\_\_ Short-Circuiting ☐Globular ☐ Spray ☐Current: AC ☐ DCEP ☐ DCEN ☐ Pulsed ☐Power Source: CC ☐ CV ☐

Other \_\_\_\_\_

Tungsten Electrode (GTAW)

Size: \_\_\_\_\_

Type: \_\_\_\_\_

**TECHNIQUE**Stringer or Weave Bead: StingerMulti-pass or Single Pass (per side) Multi-passNumber of Electrodes Single

Electrode Spacing \_\_\_\_\_ Longitudinal \_\_\_\_\_

Lateral \_\_\_\_\_

Angle \_\_\_\_\_

Contact Tube to Work Distance \_\_\_\_\_

Peening \_\_\_\_\_

Interpass Cleaning: Chip and wire brush**POSTWELD HEAT TREATMENT**

Temp. \_\_\_\_\_

Time \_\_\_\_\_

**WELDING PROCEDURE**

Pass or Weld Layer(s)	Process	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diam.	Type & Polarity	Amps or Wire Feed Speed			
Root, Fill passes	SMAW	E7018	1/4"	DC	270-380			

**Procedure Qualification Record (PQR) # \_\_\_\_\_**  
**Test Results**

**TENSILE TEST**

Specimen No.	Width	Thickness	Area	Ultimate Tensile Load, lb	Ultimate Unit Stress, psi	Character of Failure and Location

**GUIDED BEND TEST**

Specimen No.	Type of Bend	Result	Remarks

**VISUAL INSPECTION**

Appearance \_\_\_\_\_  
 Undercut \_\_\_\_\_  
 Piping porosity \_\_\_\_\_  
 Convexity \_\_\_\_\_  
 Test date \_\_\_\_\_  
 Witnessed by \_\_\_\_\_

**Radiographic-ultrasonic examination**

RT report no.: \_\_\_\_\_ Result \_\_\_\_\_  
 UT report no.: \_\_\_\_\_ Result \_\_\_\_\_

**FILLET WELD TEST RESULTS**

Minimum size multiple pass	Maximum size single pass
Macroetch	Macroetch
1. _____ 3. _____	1. _____ 3. _____
2. _____	2. _____

**Other Tests**

**All-weld-metal tension test**

Tensile strength, psi \_\_\_\_\_  
 Yield point/strength, psi \_\_\_\_\_  
 Elongation in 2 in, % \_\_\_\_\_  
 Laboratory test no. \_\_\_\_\_

Welder's name \_\_\_\_\_

Clock no. \_\_\_\_\_ Stamp no. \_\_\_\_\_

Tests conducted by \_\_\_\_\_ Laboratory

Test number \_\_\_\_\_

Per \_\_\_\_\_

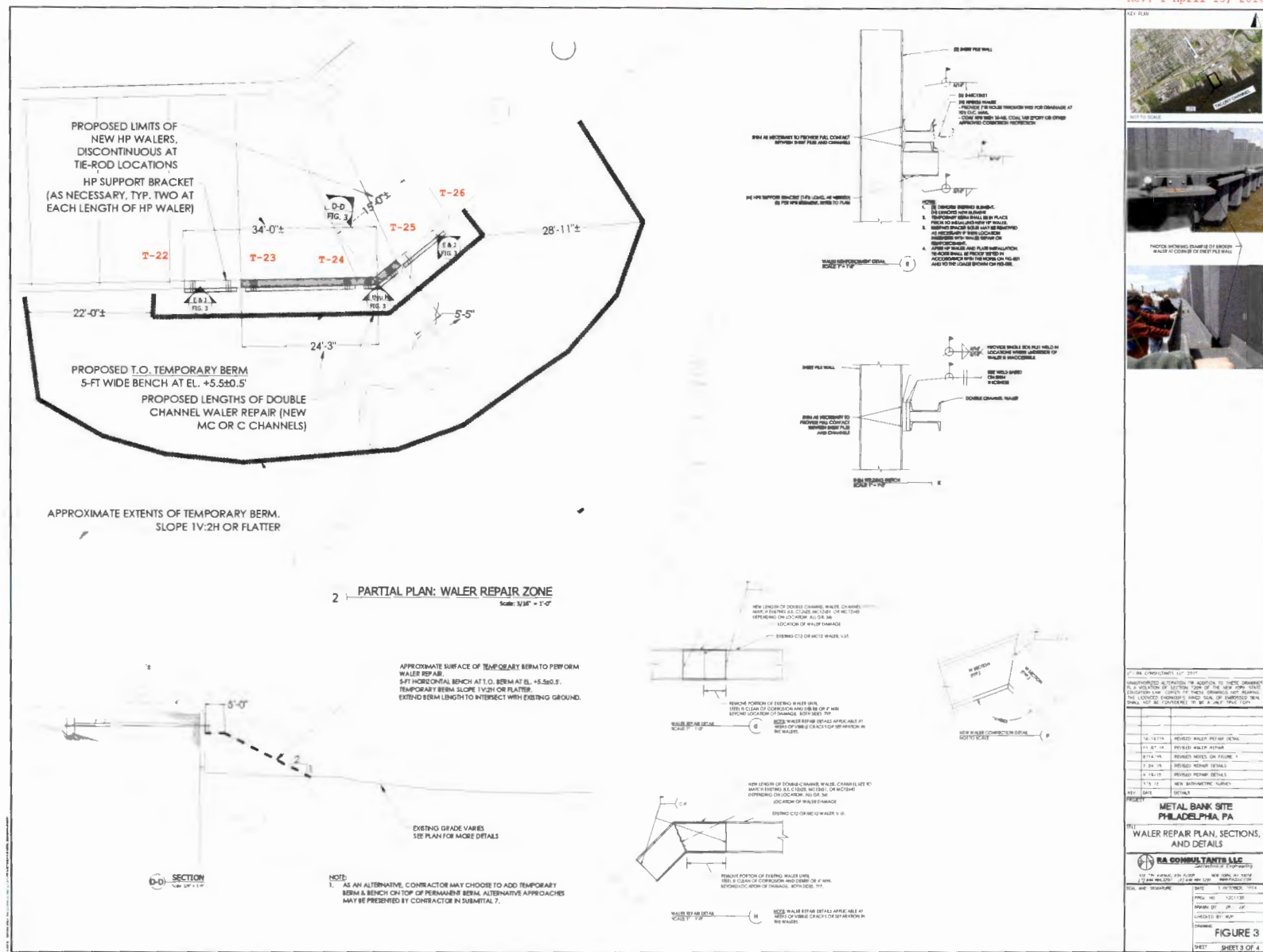
We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in conformance with the requirements of Clause 4 of AWS D1.1/D1.1M, (\_\_\_\_\_) *Structural Welding Code—Steel*.  
 (year)

Signed \_\_\_\_\_  
 Manufacturer or Contractor

By \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_







# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

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RE: Metal Bank NPL Site

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1	4/14/2016	4	RA Consultants, LLC Contract Drawings Revised Waler Repair Details
1	4/14/2016	1	Submittal #8.2 Waler Repair Shop Drawing

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SIGNED:

*Meghan Murphy*

Meghan Murphy

Project Coordinator



LEGEND:

- SURVEY MONITORING POINT (PRISM)
- (P) PREFERRED TIE-ROD TEST LOCATION
- (A) ALTERNATE TIE-ROD TEST LOCATION

NO MATERIALS OR EQUIPMENT SHALL  
BE PLACED OR STAGED IN THIS ZONE  
UNLESS CONTRACTOR CAN  
DEMONSTRATE THAT THE SURCHARGE  
WILL NOT LOAD THE SHEET PILE WALL

WORK AND STAGING ZONE

TIE-ROD I.D. & DESIGN LOAD BASED  
ON AS-INSTALLED SPACING

EXISTING DEADMAN (TYP)  
EXISTING TIE-ROD (TYP)  
EXISTING SHEET PILE WALL (TYP)

APPROXIMATE LIMITS OF  
ZONE 1 186'-6"±

APPROXIMATE LIMITS OF  
ZONE 2

SHEET PILE WALL WALE  
TO BE REPAIRED (REFER TO FIG. 3)

APPROXIMATE EXTENTS OF STABILIZING BERM.  
SLOPE 1 V:3H OR FLATTER.  
T.O. BERM EL. +2±0.5'

APPROXIMATE EXTENTS OF STABILIZING BERM.  
SLOPE 1 V:3H OR FLATTER.  
T.O. BERM EL. +2±0.5'

EXISTING GRADE  
EL (TYP.)



NOT TO SCALE

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DATE	DESCRIPTION
04/14/15	REVISED WALE REPAIR (TYP)
07/07/15	REVISED WALE REPAIR
08/14/15	REVISED NOTES TO FIGURE 1
7/24/15	REVISED REPAIR DETAILS
4/12/14	REVISED REPAIR DETAILS
5/20/12	NEW BENTHOMETRIC TURNS

REV DATE DETAIL

PROJECT METAL BANK SITE PHILADELPHIA, PA

FILE STABILIZING BERM PLAN

RA CONSULTANTS LLC  
Engineers of Engineering

210 7th Avenue 8th Floor NEW YORK, NY 10014  
TEL: 212-693-0200 FAX: 212-693-0201 WWW.RACONSULTANTS.COM

SEAL AND SIGNATURE

DATE 1 OCTOBER 2014

PROJECT NO. 1211133

DRAWN BY JAC

CHECKED BY RLP

FIGURE 2

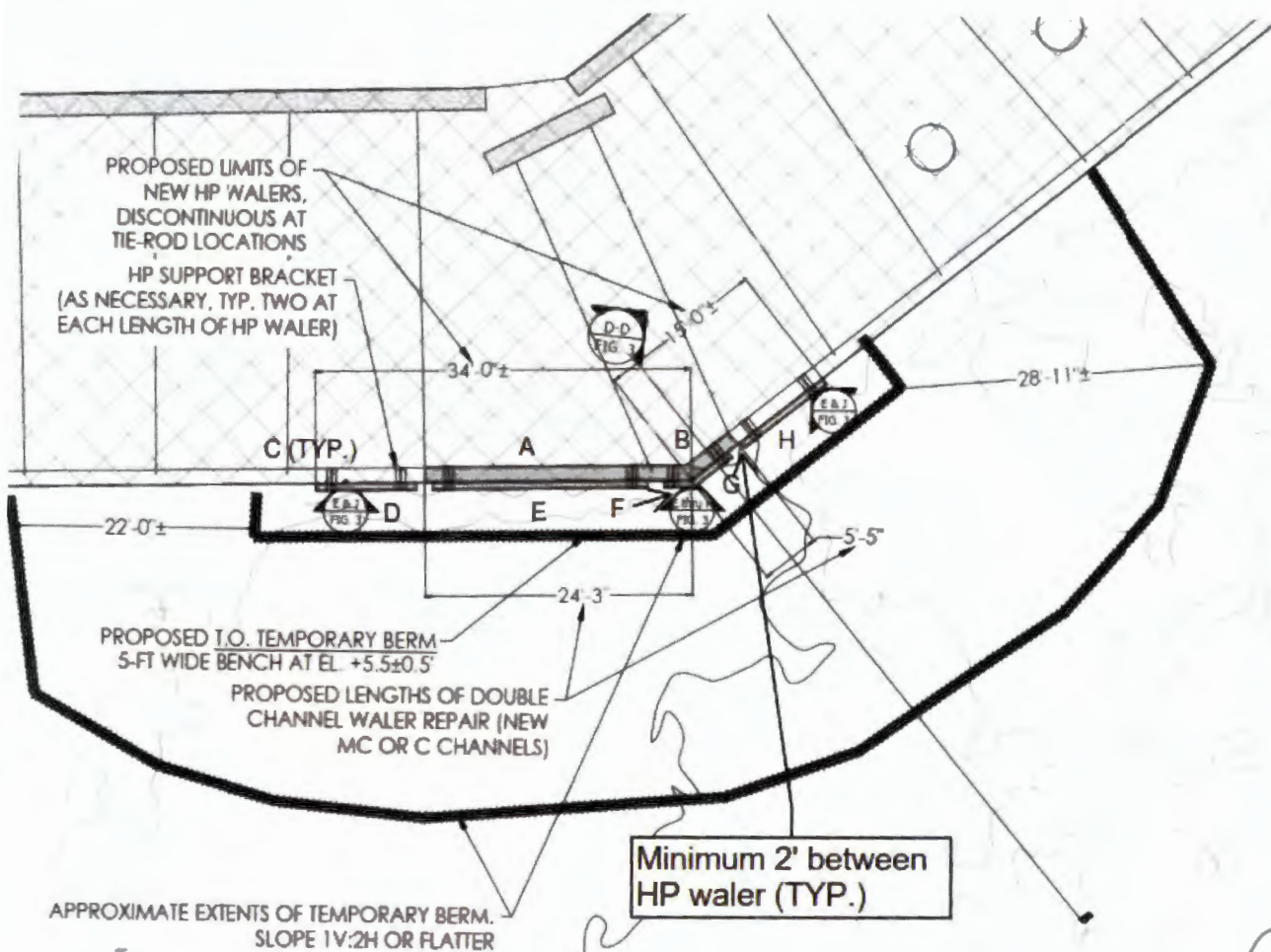
SHEET 2 OF 4

1 STABILIZING BERM PLAN  
Scale: 1/10" = 1'-0"









Provide a MC12x31 epoxy coated, fabricated double channel waler at 27' and 7.5' respectively (additional length to allow for field adjustment) spaced 4" apart to be beveled to fit corner as per Contract Figure 3 Detail H and integrate into existing, continuous double channel waler as per Contract Figure 3 Detail G. Weld the double channel waler to the existing sheet pile as per Contract Figure 3 Detail E.

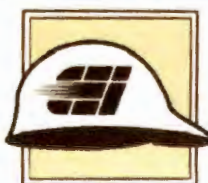
Provide epoxy coated HP8x36 brackets sized to length in field +/- 14" and weld to sheet pile in the locations of walers D-H as per plan and Contract Figure 3 Detail E.

Provide epoxy coated HP8x36 waler to be field cut to size to be installed in locations as per plan, allowing 1' clearance on either side of the tie-rod. Once cut to length, provide 1" diameter holes through web +/- 10' on center of each waler. Weld HP waler to double channel as per Contract Figure 3 Detail E. At the corner, connect the walers F and G as per Contract Figure 3 Detail F.

All welding shall be performed in accordance with Welding section on Contract Figure 1.

In areas where the waler being installed may not be able to make full contact with the existing sheet line due to its not being plumb in the vertical and/or horizontal planes, remnant HP8x36 epoxy coated waler or A36 steel plates will be used to back out the waler as necessary and will be welded as per Contract Figure 3 Detail K.

All locations where welding is to occur will have the epoxy coating removed and the area cleaned such that a proper weld can be achieved. The exposed surfaces where the epoxy coating has been removed or damaged will be cleaned and epoxy coated using field touch up kits that are compatible with the epoxy coating on the existing steel.



Creamer Environmental, Inc.  
12 Old Bridge Road  
Cedar Grove, NJ 07009  
P: 201-968-3300 F: 201-968-3301

Project: **Metal Bank NPL Site, Philadelphia, PA**  
Title: **Waler Repair**  
Date: Rev. 2 April 14, 2016  
Drawn by: MEM  
Checked by: TJC  
Sheet 1 of 1





# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

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Environ International Corporation

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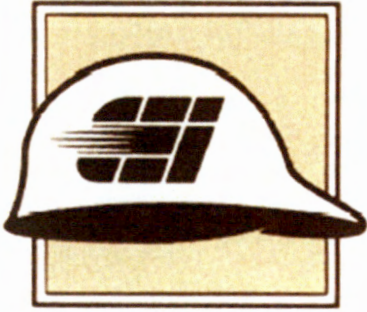
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*Meghan Murphy*

Meghan Murphy

Project Coordinator



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12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Monitoring Plan**

There are currently eight existing survey monitoring prisms, Targets A through H, located along the sheet pile bulkhead. Creamer Environmental, Inc. (CEI) will utilize these points as well as establish additional survey monitoring points as a part this Monitoring Plan. Louis J. Weber and Associates (Weber) will be the licensed professional surveyor performing the work. Please see the attached figure for monitoring point locations and a summary of monitoring frequencies. Also attached is a cut sheet for the angled reflective monitoring targets which will be installed as the new survey monitoring points are accurate to within .25" which is sufficient to achieve the monitoring requirements for movement as per the Monitoring section on Contract Figure 1. The targets will be mounted directly to the steel with epoxy and will remain in-place once the work is completed. Prior to the start of work, CEI will monitor the existing points and the newly installed survey monitoring points to establish a baseline.

CEI will monitor the Targets A through H twice per week when only rip rap installation is occurring. Continuous monitoring will be performed during the detensioning for the waler repair and proof testing of the tie-rods.

At each of the proof test locations not associated with the waler repair, Tie-Rod IDs T-2, T-5, T-14, T-28 and T-39, targets will be established to be monitored during the proof testing activities at that location and one time subsequent to the anchor being locked off at the specified capacity. One target will be placed directly behind the tie-rod being tested and one on either side of the tie-rod halfway to the next tie-rod location. At T-28 and T-39, the existing Targets D and B, respectively, will be used rather than installing a new target.

Where the waler is being repaired a target will be established behind each tie-rod as well as one tie-rod beyond either end of the repair, Tie-Rod IDs T-22 through T-26. These targets will be monitored during the detensioning of the tie-rods in the waler repair area and during proof testing at that location as well as one time subsequent to the work.

The monitoring measurements will be compared to the baseline survey and in the event that movement of .5" or greater is observed, the Construction Manager and RA Consultants LLC (RAC) will be notified immediately. The same notifications will be made if sudden changes in the sheet pile wall or other site structures are observed. All monitoring measurements, including baseline and regular intervals, will be provided to the Construction Manager, RA Consultants, and EPA. Monitoring reports will be provided to the Construction Manager and RAC upon receipt from the surveyor.

investment in high tech survey equipment. Save crew time, keep employees out of danger, get better data, and feel more secure about construction layout: can you afford *not* to use Rothbucher Systeme markers?


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- Simple and quick measurement and monitoring of buildings, facades, supporting structures, pillars, high rack storage facilities, dams and much more.
- For monitoring formwork during the concrete work, e.g. in the case of bridge arches and single-faced wall formworks.
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Please note: Adapter with target reflectors are exclusively recommended for carrying out distance measurements using a tachymeter or total station.

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CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

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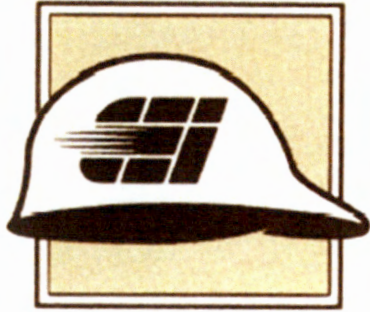
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COPY TO:

SIGNED:

*Meghan Murphy*

Meghan Murphy  
Project Coordinator



# CREAMER ENVIRONMENTAL, INC.

REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Rip Rap Elevation Survey Plan**

Creamer Environmental, Inc. (CEI) will mobilize to the site and as a part of the site preparation activities, a bathymetric survey will be performed by Aqua Survey Inc. to verify the bottom elevations and determine how much rip rap needs to be placed to achieve the proper design elevations. Within Zone 2 the rip rap work platform installed to facilitate the waler repair work will remain in place and become part of the stabilization berm. As the rip rap is being placed, CEI will utilize the cable/chain of the clamshell bucket with incremental measurements marked off to guide the installation and sound the elevations of the berm during the placement. Where an excavator is used to place the rip rap near the sheet pile wall the stick of the excavator will be marked and used to determine the elevation of the rip rap as it is placed. The berm will be surveyed by Louis J Weber and Associates (Weber), a licensed professional surveyor, every other day during installation to determine if it is at the correct elevation within an approximate tolerance of  $\pm 6"$ . Based on the large size of the riprap the top surface will most likely vary by more than  $\pm 6"$  since the majority of the stones are going to be 1' or larger.

Weber will implement conventional survey methods. It is noted that the channel is tidal and the measurements must be made with respect to a known elevation landside. A landside total station with a surveyor on a boat with a rod and prism will collect the horizontal and vertical data. The sensitivity of the survey method is greater than the variation of the rip rap surface. CEI will endeavor to maintain the surface such that it conforms to the proposed finished grades. Once an area is at the proper elevation it will be spot checked 2-3 days later to determine that it has not settled. If settlement has occurred Environ will be notified and CEI will await direction on how to proceed. After all of the rip rap has been placed a second bathymetric survey will be performed to generate the as-built, repair-related survey for the records. Longer term monitoring for movement of the sheet pile wall (prisms) and settling of the rip rap berm (bathymetry) will be performed by Ramboll Environ as part of the site's long term monitoring activities, the results of which will be reported to EPA.



# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

**Environ International Corporation**

**20 Custom House Street**

**Boston, MA 02110**

**DATE: 4/15/16**

**JOB NO.: 16-0463**

**ATTENTION: Nicholas Steenhaut**

**RE: Metal Bank NPL Site**

**WE ARE SENDING YOU**

- ☐ Shop Drawings  
☐ Copy of letter



Attached



Prints



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Under separate cover via \_\_\_\_\_ the following items:



Plans



Samples



Specifications



\_\_\_\_\_

COPIES	DATE	PAGES	DESCRIPTION
1	4/15/2016	5	Submittal #11.3 Turbidity Control Plan

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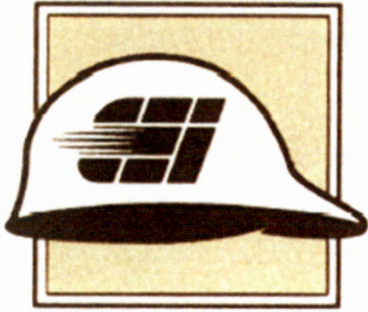
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*Meghan Murphy*

**Meghan Murphy  
Project Coordinator**



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REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Turbidity Control Plan**

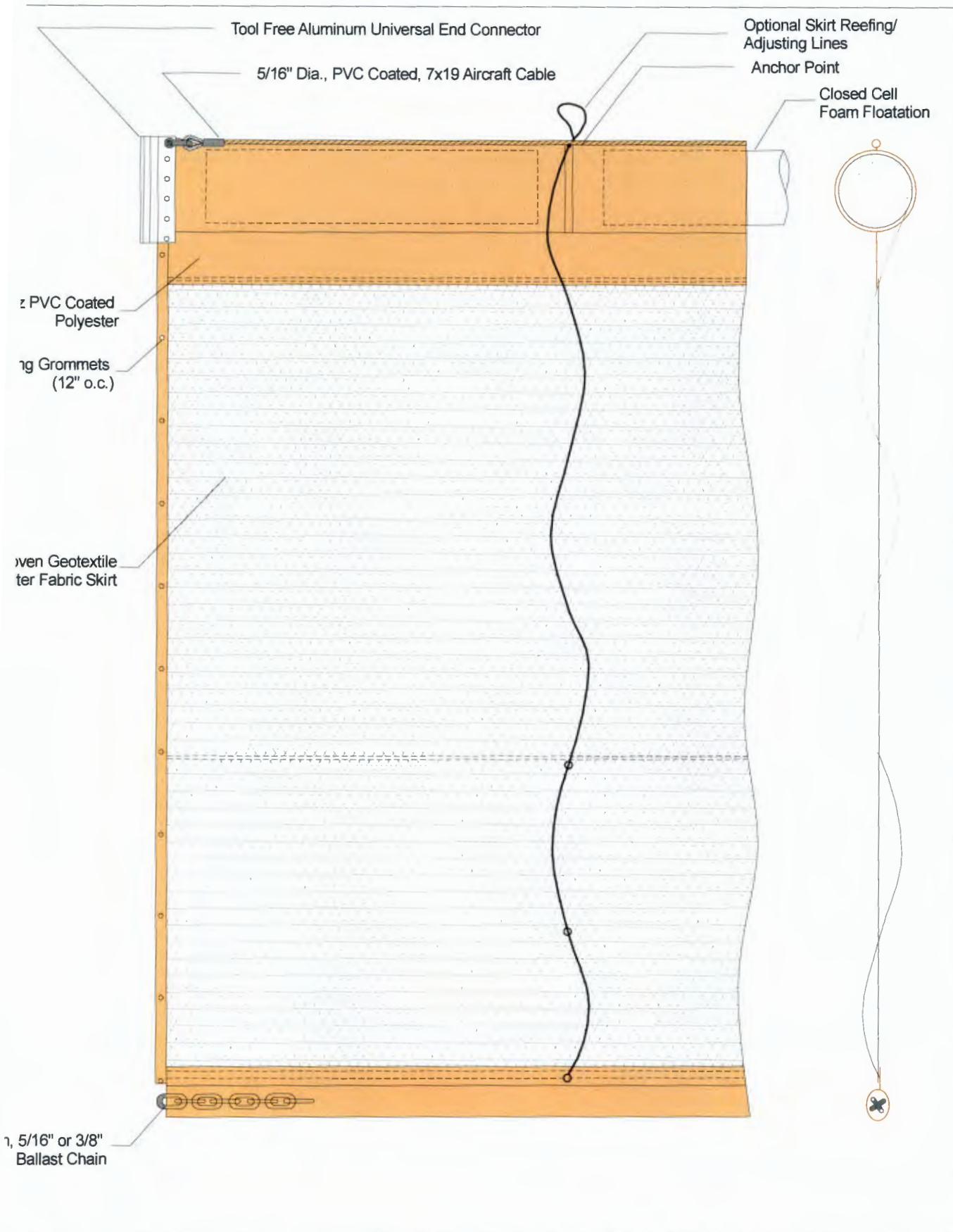
Turbidity control will consist of three elements: a turbidity barrier; rip rap placement to minimize turbidity; and turbidity monitoring. Creamer Environmental, Inc. (CEI) will install a turbidity barrier approximately 20' outboard of the stabilizing berm to control turbidity during the installation of the riprap. The turbidity barrier with a 12' woven geotextile filter fabric skirt as per the attached drawing will be deployed in two phases to maintain tighter control of the work areas. The curtain will be installed with the optional skirt reefing lines which will allow CEI to adjust the length of the skirt between the zones such that the skirt isn't in contact with the sediment during low tide. Phase I will encompass Zone 1 and the majority of Zone 2 and Phase II will encompass the remaining portion of Zone 2 and all of Zone 3. CEI will first install an anchoring system for the barrier, with spacing approximately every 50' and anchors positioned on alternating sides of the barrier. Mooring buoys will be used to reduce the risk of submerging the barrier's flotation under heavy loads. Once the anchors are installed, CEI will attach the turbidity barrier.

The R6 stone specified for the stabilizing berm does not contain fines, which will help control turbidity. In addition, when the initial (bottom) layer of rip rap is being installed, the clamshell or excavator bucket will be lowered to within 1' to 2' of the bottom and opened slowly to lay the rip rap on the bottom to form a contiguous layer as opposed to dropping the stone from a greater distance through the water column. Each subsequent layer of stone will be placed via bucket lowered to within 2' to 3' of the previous layer in order to minimize turbidity. CEI will perform turbidity monitoring during the rip rap installation activities only. The turbidity will be monitored every two hours during the first day of stone placement in each of the three zones. If turbidity data is within the approved limits, monitoring will then be performed twice a day thereafter or more frequently as needed and whenever it is evident that sediment has been disturbed and mobilized. CEI will collect readings utilizing the attached turbidity meter from an up-gradient, down gradient and two intermediate locations via boat. The up-gradient and down gradient monitoring locations will be approximately 100' from either end of the turbidity barrier and the intermediate locations will be proximate to the active work area, an estimated 25' off the turbidity curtain, and will progress with the work as per the attached plan. The turbidity meter has a fully submersible sensor which will be lowered over the side of the boat, to the center depth of the water column. During low tide or when the water depth is not adequate for the boat to operate, monitoring will be suspended

and noted in the monitoring records. Every attempt will be made to perform monitoring outside of the low tide events.

The sensor is a 90-degree scatter nephelometer which detects light intensity that is directly proportional to the turbidity in the water. If the level of turbidity at the down gradient location is 15% greater or more than 35 NTUs higher than the level at the up-gradient location, whichever is greater, CEI will notify the Construction Manager and RA Consultants LLC immediately for re-evaluation of work activities. If turbidity is detected at the up-gradient monitoring location for Phase I, in proximity to the Combined Sewer Overflow (CSO) outfall, CEI will monitor within the barrier and if it can be demonstrated that the turbidity is not attributed to the work activities, the criteria will not apply. The turbidity barrier will be removed when turbidity measurements inside the turbidity barrier are equal to or less than those outside the barrier at the conclusion of each phase.





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[www.iwtcargoguard.com](http://www.iwtcargoguard.com)

PROJECT: Metal Bank NPL Site

LOCATION: Philadelphia, PA

SHEET NO.: 1 OF 1

SCALE: Not To Scale

DATE: 2/24/16

DRAWN BY: TJP

# WQ770-b Turbidity Meter



- Portable unit with completely submersible sensor
- Simple and convenient to use
- Marine grade cable with strain relief
- Rugged anodized aluminum sensor housing

## Applications

Applications include; water quality testing and management, river monitoring, stream measurement, reservoir water quality testing, groundwater measuring, water and wastewater treatment, effluent, and industrial control.

For environmental monitoring, the sensor is placed directly into a river or lake, and positioned where the turbidity is to be monitored.

## Description

The Global Turbidity Meter is a highly accurate device with a fully submersible sensor for in-situ environmental or process monitoring. The meter is provided with a padded carrying case and 25' of marine grade cable, with lengths up to 100' available upon request.

### Method:

In accordance with USEPA Method 180.1 for turbidity measurement the sensor is a 90 degree scatter nephelometer where a focused beam is directed into the monitored water. The light beam reflects off particles in the water, and the resultant light intensity is measured by a photodetector positioned at 90 degrees to the light beam. The detected light intensity is directly proportional to the turbidity of the water. The WQ770 sensor utilizes a second light detector to correct for light intensity variations, color changes, and minor lens fouling.

### Calibration:

All turbidity meters are factory calibrated to the highest standards and should not need recalibration for 6-12 months. User calibration, when required, is very easy using the step-by-step scaling process within the display unit.

## Specifications

*Range:* 0-50 NTU and 0-1000 NTU

*Accuracy:*  $\pm 1\%$  of full scale

*Resolution:* 12 bit

*Method:* Nephelometer with correction

*Power:* Internal 9VDC battery

*Warm-up Time:* 3 seconds minimum

*Operating Temperature:* 32 to 122°F (0 to +50°C)

*Materials:* 306 stainless steel, delrin, Sapphire optical windows, Polyurethane jacketed cable.

*Pressure:* 30 psi max.

*Light Source:* pulsed LED (880nm)

*Cable Length:* Meter=25' standard (optional to 100')

*Sensor Size:* Body= 1 1/2"D x 8.5"L Sensor Shield= 1 1/2" x 2"

*Overall Length:* 9"

*Weight:* 2 lbs.

## Options and Accessories

### WQ770-b Turbidity Meter

Includes sensor on 25' cable standard.

### WQEXC Extra Cable

Cable length is measured from end of cable to bottom of sensor. After 25', up to 100'

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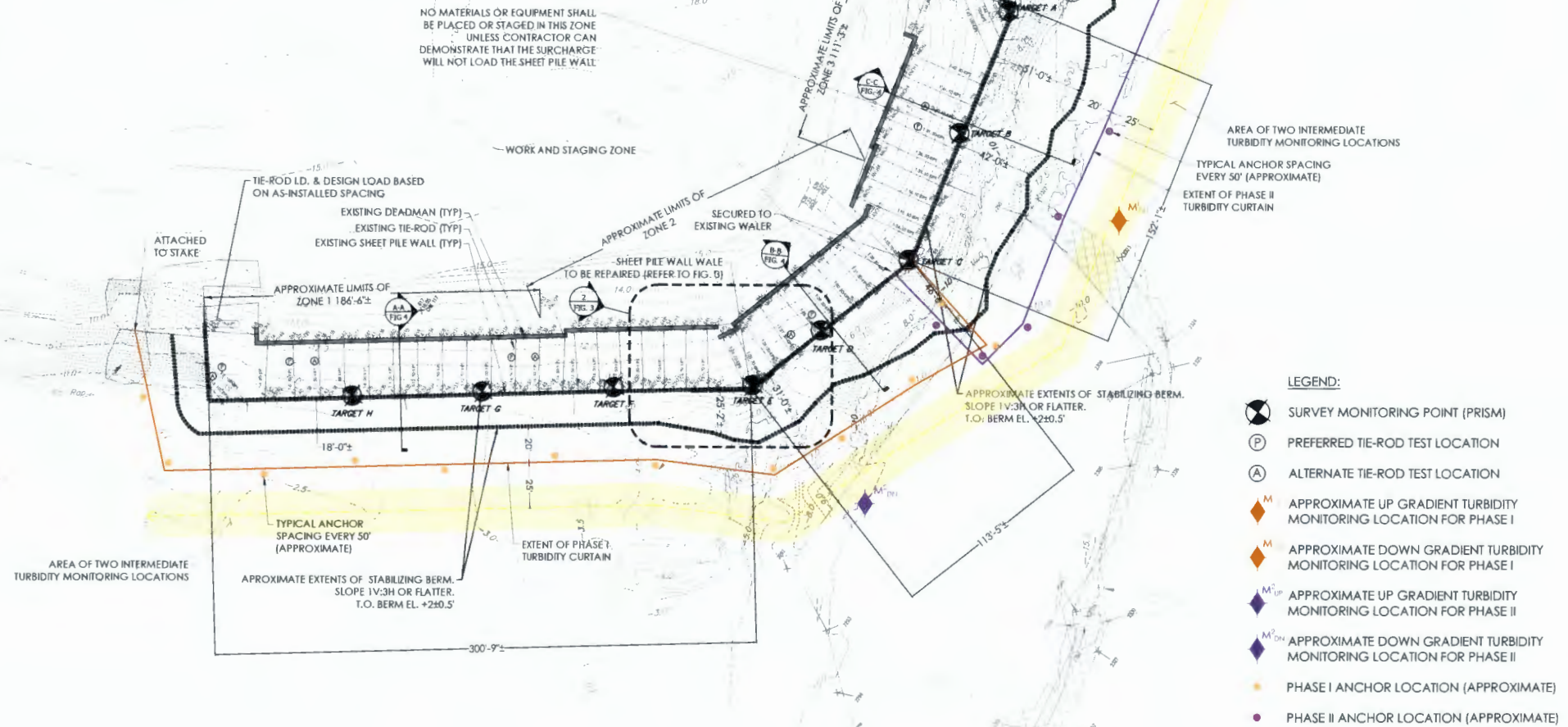
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Visit our online catalog at:  
[www.globalw.com](http://www.globalw.com)  
Our Address:  
11390 Amalgam Way  
Gold River, CA 95670





TURBIDITY CONTROL PLAN

Scale: 1/32" = 1'-0"

SOURCE: SHAPING ENTITLED STABILIZING BERM PLAN FOR PETAL BANK SITE, PHILADELPHIA, PA. SUBMITTED ON 8 OCTOBER, 2014 AND ON REVISIONS: MAJOR REPAIR. PREPARED BY RA CONSULTANTS LLC, GEOTECHNICAL ENGINEERS, NEW YORK, NY

NO.	REV.	DATE	DESCRIPTION
1	0		
TURBIDITY CONTROL PLAN			
PETAL BANK WFL SITE, PHILADELPHIA, PA			
RAMBOLL ENVIRON			
DESIGNED BY: NO	DATE: 04/11/2019	FIGURE	
CHECKED BY: NO	DATE: 04/11/2019		



**CREAMER ENVIRONMENTAL, INC.**

CONTRACTORS &amp; CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

**LETTER OF TRANSMITTAL****Environ International Corporation****20 Custom House Street****Boston, MA 02110****DATE: 3/15/16****JOB NO.: 16-0463****ATTENTION: Nicholas Steenhaut****RE: Metal Bank NPL Site****WE ARE SENDING YOU**☐ Shop Drawings☐ Copy of letter☒ Attached☐ Prints☐ Change order☐

Under separate cover via \_\_\_\_\_ the following items:

☐ Plans☐ Samples☐ Specifications☐

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1	3/15/2016	19	Submittal #12 Tie-Rod Testing Qualifications

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**CONSULTANTS, INC.**  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

**Tel: (800) 545-ATUL  
(908) 754-8383  
Fax: (908) 754-8633**

# **TIE-ROD TESTING QUALIFICATIONS**

## **FOR**

# **METAL BANK NPL SITE**

**March 15, 2016**

- **Reference List of Welding – Anchor Bolt Pull Test Projects**
  - **Sample Report and Certificate of Inspection**

**ANS CONSULTANTS, INC.**  
**LIST OF WELDING - ANCHOR BOLT PULL TESTS PROJECT**

Sludge Thickening Facilities 99 Greenbank Road Boonton, NJ(Morris County)	Tomar Construction, LLC 18 Connerty Court East Brunswick, NJ 08816 Attn : Mr. Robin John Varghese	Jan-11		732-238-0700
Pier-7, Phase II Proposed Add. & Interior Alts. 92 Columbia Street Brooklyn, NY	Barlo Associates, LLC 92 Mantoloking Road Brick Township, NJ 08723 Attn : Mr. Dan Governale	Jun-11		732-477-7751
St. George Ferry Terminal Staten Island, NY Contract # HBR1217 Pin Number 84108SIBR330	Conti of New York, LLC 26 Bay Street, 2nd Floor Staten Island, NY 10301 Attn : Michael Mejaki	Nov-11		212-742-0333
400 Industrial Avenue Maintenance Facility Building #73 Teterboro, NJ 07068 Job #2290	VRH Construction 320 Grand Avenue Englewood, NJ 07631 Attn : Patrick Mc Govern	Dec-11		347-672-6802
Steambank Protection(Section 14) Yonkers Avenue Village of Tuckahoe, NY Project #153725	Hirani Construction Management Inc. 30 Jericho Executive Plaza, Suite 200C Jericho, NY 11753 Attn : Saleh Bhuiyan sbhuiyan@hiranigroup.com	Feb-12		516-248-1010
2244 Church Avenue Brooklyn, NY	Church Avenue Development, LLC 8332 Parson Blvd Jamaica, NY 11432 Attn : Jamie A. Contreras	Aug-12		718-480-4444
Honda Dealership 1201 Route 22 West Bridgewater, NJ	Redco Engineering Contracting Co. 137 Elmer Street Westfield, NJ 07090 Attn : Tom Torres	Oct-12		908-233-4030
905 Tinton Avenue Bronx, NY	United Technology, Inc 141 New Hyde Park Road Franklyn Square, NY 11010-3045 Attn : Deven Butala	Mar-13		646-884-0560
87-10 Northern Boulevard Manhattan, nY	The Babaev Group 8332 Parsons Blvd Jamaica, NY 11432 Attn : Meir Babaev Meir@bgny.co	May-13		718-480-4444



# LIST OF WELDING - ANCHOR BOLT PULL TESTS PROJECT

ghts n Street & Hudson Avenue d, NJ	Reivax Contracting 356 Thomas Street Newark, 07114 Attn : Louis Santanas lsantana@reivaxcontracting.com	Sep-13		973-817-5553
ittpenn Bridge -Phase II Duffield Avenue & Howell Street J	Union Paving & Construction Co., Inc. 1140 Globe Avenue Mountainside, NJ 07092 Attn :Mr. Andy Creteau	Oct-13		908-810-6723



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February 27, 2012

Hirani Construction Management Inc  
30 Jericho Executive Plaza, Suite 200C  
Jerico, NY 11753

Attn : Mr. Eric Hirani

Re: **Dywidag Soil/Rock Anchor Proof Testing**  
Yonkers Avenue Village of Tuckahoe  
Section 14 Stream Bank Protection Project  
USACE-Project # 153725  
Dny # SB 402, RFI-14 Amendment on Drawing SB402 and Hirani Shop Drawing  
S-003.00 on dated 01/18/2012

Dear Mr. Hirani:

As per our written procedure dated February 16, 2012, using calibrated center hole jack and hydraulic pump, one Dywidag Bar Rock anchor was tested to its 101 kips capacity. Elongation readings were also obtained. Please see attached field report dated 2-22-2012.

PTI Rock Anchor Installation & Testing reference pates are attached. The PTI-4, chapter refers to ASTM A722 bar and it's specific strength etc. We have used this bar. Hence, it meets the requirements. The Chapter 8 refers to Stressing and Testing We have performed "Proof Test". See page #74 and # 75.

We understand that we do not have "Cyclic Loading" condition on these anchors and the static load of 101 kips was applied in two increments and sustained with-out any slippage or "Creep". Hence, we conclude that the tested anchor rod is satisfactory.

Should you have any questions or require additional information, please do not hesitate to contact the undersigned at (908)-754-8383.

Sincerely,  
ANS Consultants, Inc



File: ans.nn.022712.064.HiraniConstructinManagementInc.

# **Recommendations for Prestressed Rock and Soil Anchors**





## 4.0 MATERIALS

### 4.1 General

These Recommendations cover materials for prestressed rock and soil anchor systems utilizing prestressing steel.

### 4.2 Prestressing Steel

Tendons shall be fabricated from prestressing steel bar or strand either in single or multiple element tendons.

Mill test reports for each heat or lot of prestressing material used to fabricate tendons shall be submitted if required by the Owner. Test reports for strand shall include bond capacity tests results in accordance with ASTM A 981.

Prestressing steel shall conform to the following specifications:

#### 4.2.1 Strand

Strand shall conform to ASTM A 416, including the Supplementary Requirement S1, and shall be weldless, low relaxation grade.

#### 4.2.2 Bar

Bars shall conform to ASTM A 722. Since ASTM A 722 does not address relaxation requirements for bars, the designer shall include such requirements in the project specifications.

Representative stress-strain curves for full bar cross section shall be submitted by the bar tendon supplier for evaluating the anticipated elongation behavior of the bars during testing. For bars that

## C4.0 MATERIALS

### C4.1 General

For the ASTM Designations, the latest edition applies.

### C4.2 Prestressing Steel

Tendons made from wire or indented or compacted strand, or nonmetallic tendons, are not currently used for anchors in North America and are not included in these Recommendations. This should not preclude their use when suitability is established.

#### C4.2.1 Strand

The use of low relaxation strand is recommended because of its lower long-term losses. 15.2 mm (0.6 in.) diameter strand is predominantly used for anchors. Supplementary Requirement S1 in ASTM A 416 references ASTM A 981, a test method for evaluating adequate bond between strand and surrounding grout.

#### C4.2.2 Bar

Bars not conforming to A 722 are not covered by these Recommendations because of one or more of the following reasons:

- Insufficient strength
- Ratio of yield to ultimate strength lower than 0.80
- Different stress strain characteristics
- No cold stressing during manufacturing
- High relaxation
- Low elongation under load, when using low-grade steel, and resulting large changes in load under movements in the anchored structure

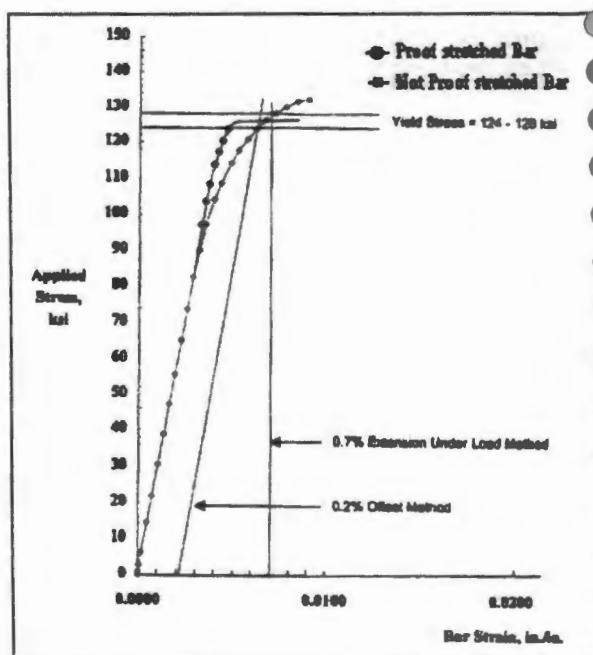
Bars meeting the relaxation values specified for low relaxation strand are available.

Bars that have not been proof stretched may exhibit some plastic behavior prior to reaching the yield point, but still

have not been proof stretched during manufacturing to  $0.8 F_{pu}$ , creep test data shall also be submitted.

will conform to the requirements of ASTM A 722. A 722 allows determining the yield strength for bars at a total strain of 0.7 percent or by the offset at 0.2 percent. Currently, bars 46 mm (1 3/4 in.) diameter and are not proof-stretched.

Figure 4.1 Typical stress-strain curves for bars



#### 4.2.3 Epoxy-coated Strand

Epoxy-coated strand shall conform to ASTM A 882 and shall be epoxy filled and grit impregnated.

For more information see the "Supplementary Requirements for Epoxy-Coated Strand Tendons" section of this publication.

#### 4.2.4 Epoxy-coated Bar

Epoxy coating for ASTM A 722 bars shall conform to the coating requirements stated in ASTM A 775 or in A 934.

#### 4.2.5 Patching Materials

The patching material shall be a product approved by the powder coating manufacturer and be curable and inert in cement grout.

#### C4.2.3 Epoxy-coated Strand

Unfilled epoxy-coated strand is not recommended anchors, because water may enter the interstices around the center wire and subsequently lead to corrosion of steel.

#### C4.2.4 Epoxy-coated Bar

Requirements for thicker coatings than specified in ASTM A 775 and A 934 may result in reduced bond to grout and difficulties in threading hardware over the coated bar.

Of the two standards, A 934 will result in an epoxy coating on the bar that is more abrasion resistant.

#### C4.2.5 Patching Materials

Two component compounds are used for patching holidays and damaged areas of the epoxy coating of bars and strand.

### 4.3 Anchorages

Anchorages shall be a combination of either a steel bearing plate with wedge plate and wedges, or a steel bearing plate with a threaded anchor nut. The steel bearing and wedge plate may also be combined into a single element.

Anchorage devices shall conform to the static and, when applicable, dynamic strength requirements of Section 4.1 in Ref. PTI 1.

Anchorages shall be capable of developing 95 percent of the ultimate tensile strength of the prestressing steel when tested in an unbonded state.

For wedge type anchorages, due to the critical interrelationship of the component parts, different supplier's component parts shall not be mixed. Wedges for anchor heads shall not be reused.

Wedges shall be designed to preclude premature failure of the prestressing steel due to notch or pinching effects under static and dynamic strength requirements of Section 4.1. and 4.1.3 in Ref. PTI 1.

Anchor nuts for bars shall comply with the performance requirements of Section 4.2 in Ref. PTI 1.

Anchor nuts and other threadable hardware for epoxy-coated bars shall be designed to thread over the epoxy-coated bar and still comply with the requirements for carrying capacity. Uncoated bar ends for permitting easier threadability shall not be allowed.

The bearing plate shall be fabricated from steel conforming to ASTM A 36, A 588, A 709 or A 572 specifications, or equivalent, or may be a ductile iron casting conforming to ASTM A 536.

The trumpet shall be fabricated from a steel pipe or tube conforming to the requirements of ASTM A 53 for pipe or ASTM A 500 for tubing. The trumpet shall have a minimum wall thickness of 3 mm (0.125 in.) for diameters up to 100 mm (4 in.) and 5 mm (0.20 in.) for larger diameters.

Anchorage covers shall be fabricated from steel or plastic with a minimum thickness of 2.3 mm (0.09 in.). The joint between the cover and the bearing plate shall be watertight.

### C4.3 Anchorages

Project specifications should state whether the anchorages need to be of a restressable or destressable type.

Two- and three-part wedges are used. Two-part wedges require larger ductile deformations than three-part wedges for proper uniform embedment of the wedge teeth into the strand under a fully seated position. Three-part wedges will uniformly engage the strand with less relative movement and under lower loads. For the same reason, three-part wedges are significantly less susceptible to longitudinal cracking.

The trumpet is used to provide a transition from the anchorage to the unbonded length corrosion protection.

Plastic pipe may also be used, provided that there is a reliable seal to the bearing plate and provisions are made to prevent cracking as a result of misalignment with the tendon.

The cover needs to completely encapsulate the anchor head and tendon tail, and has to be sealed against the bearing plate.



### Grout Tubes

Grout tubes shall have an inside diameter adequate to enable the grout to be pumped readily and without blockage to the bottom of the drill hole. They shall be able to withstand the expected grout pressure. Post-grout tubes shall be strong enough to withstand the post-grouting pressure.

### Grout Socks

Grout socks shall be made from a woven synthetic fabric resistant to tears and handling damage. The fabric textile apparent opening size (ASTM D 4751) shall be such that they will allow water to filter out of the grout but prevent significant amount of cement fines to pass.

### Grout

Cement based grouts are most commonly used for anchors. Polyester resins have been used in certain applications.

#### C4.11.1 Cement Grout

##### a) Cement

Cement grout shall be made from Type I, II, III or IV portland cement conforming to ASTM C 150.

##### b) Water

Water used in the grout should be potable (suitable for public consumption), clean and free of injurious quantities of substances known to be harmful to portland cement or prestressing steel. In areas where potable water is not readily available, local water may be used provided the water is tested to assure that it is not detrimental to the tendon or grout.

### C4.9 Grout Tubes

Grout tubes are normally made from polyethylene and usually have a minimum inside diameter of 13 mm (0.5 in.), although smaller diameters are possible to fill the insides of encapsulations or trumpets and anchorage covers. For most anchors, a 1 MPa (150 psi) pressure is suitable. In some instances, higher pressure-ratings may be required.

Post-grouting pressures can reach up to 8 MPa (1200 psi).

### C4.10 Grout Socks

Commonly geo-textiles of long-chain, synthetic polymer composed at least 95% by mass of polyolefin or polyester are used.

Grout socks may be used for the bond length only, or over the entire length of the anchor, provided that a bond breaker is used in the free length.

### C4.11 Grout

Cement based grouts may incorporate fine or coarse aggregate depending on the geological and construction conditions. They may also include admixtures or additives to modify fluid and set properties to satisfy specific project goals.

#### C4.11.1 Cement Grout

Blended cements (to ASTM C 595) are typically neither necessary nor used for anchors, nor are oil well cements. Equally, mineral additives (fly ash, ground granulated blast furnace slag and silica fume) have not been used in anchor grouts to date even though they have the potential to provide certain technical benefits in the fluid and set phases (Ref. PTI 6). They are more commonly used in grouts for post-tensioning ducts.

Insufficient cube strength shall be investigated, but not be cause for rejecting a successfully tested anchor.

#### 7.8.2.4 Test Methods for Cement Based Grouts

Compressive strength tests shall be performed in accordance with ASTM C 942 for grout cubes, or ASTM C 39 for grout cylinders.

Wet density of the grout shall be determined using the API Mud Balance Test (Ref. 9.1.6) or ASTM C 138.

Bleed tests shall be performed in accordance with ASTM C 940.

#### 7.8.3 Grouting Operations

When the wedge plate for strand anchors is not in place, grouting of tendons shall be stopped far enough behind it to allow flaring of the individual strands into the wedge plate without sharp deviations. Care shall be taken to prevent contamination of the wedges and wedge holes with grout.

The transition tube, if required, shall be inserted into the secondary grout while the grout is still fluid.

##### 7.8.3.1 Grouting Uncased Holes

Once the hole has been drilled, the tendon can be inserted and the drill hole filled with grout. The grout is pumped through a tube extending to the bottom of the drill hole. The grout tube may remain in place or be pulled as the grout level rises. The end of the grout tube shall be kept below the top of the grout surface when pulling the grout tube.

##### 7.8.3.2 Grouting Cased Holes

Once the casing has been fully installed and the tendon has been inserted, any full-face drill bit, if used, is disengaged from the leading edge of the casing and the casing filled with grout.

The casing is then withdrawn as additional grout is pumped (with or without pressure) through the casing cap or grout swivel. Pressure may vary from 0.35 MPa (50 psi) to 2.8 MPa (400 psi), depending on the nature of the ground in the bond length and any additional grouting that will be performed (see Section 7.8.4).

The owner may reserve the right to request grout cubes at any time throughout the project if doubts arise as to the in situ grout strength. The contract should establish payment terms for additional compressive strength testing.

#### C7.8.3 Grouting Operations

##### C7.8.3.1 Grouting Uncased Holes

Alternatively, the hole may be filled with grout prior to insertion of the tendon.

##### C7.8.3.2 Grouting Cased Holes

Alternatively, the casing may be filled with grout prior to insertion of the tendon.

Attention should be paid to the grout pressure/volume/time characteristics during the injection of each anchor to avoid possible ground heave.

## STRESSING, LOAD TESTING AND ACCEPTANCE

### General

Stressing and testing are required for every anchor, for the following two functions:

To demonstrate that the anchor meets the acceptance criteria.

To stress and lock-off the tendon at its specified load.

Equipment and procedures shall be designed accordingly. Testing procedures are independent of anchor type.

### 1 Preparation Prior to Stressing

Practical and reasonable steps shall be taken prior to stressing to ensure a level of cleanliness and adequate lubrication of wedge holes and wedges, such that all components can perform as designed.

### Equipment

#### 2.1 Requirements for Equipment

Stressing equipment shall be capable of stressing the whole tendon preferably in one stroke to the specified Test Load.

Regripping of strands, which would cause overlapping wedge bites, or wedge bites on the tendon below the anchor head, shall be avoided.

Stressing and testing of multiple element tendons with single element jacks is not permitted, unless the single element jacks are synchronized and apply the total test load to the entire anchor simultaneously.

The equipment shall be capable of stressing the tendon to the maximum specified Test Load within the rated capacity.

The equipment shall permit the tendon to be stressed in increments so that the load in the tendon can be raised or lowered in accordance with the test specifications, and allow the anchor to be lift-off tested to confirm the lock-off load.

## C8.0 STRESSING, LOAD TESTING AND ACCEPTANCE

### C8.1 General

Stressing and recording should be carried out by experienced personnel under the control of a suitably qualified supervisor, preferably provided by a specialist anchor contractor/supplier or an engineering agency fully experienced with the procedures.

#### C8.1.1 Preparation Prior to Stressing

Adequate lubrication is important to ensure that the wedges, during seating, do not become restricted under the lateral load resulting from strand deviations. Wedges restricted in this way can cause strand slippage through the wedge during lock-off operations.

### C8.2 Equipment

#### C8.2.1 Requirements for Equipment

Regripping of strands during stressing may have to be considered on practical grounds in certain instances.

A single strand jack may be used to place an equal Alignment Load on the individual strands of long multi-strand tendons prior to stressing with a multi-strand jack.

The rated pressure is lower than the actual jack capacity. Pressure limiting valves on the hydraulic jacks or pumps should be set by the supplier such that the rated pressure cannot be exceeded.



Hydraulic jacks shall be calibrated together with the production and reference gauges against a load cell or test machine, whose calibration is traceable to NIST. During this calibration, the production and reference gauges shall be concurrently calibrated against a master gauge. These calibrations shall be done to an accuracy of  $\pm 2\%$  within 9 months prior to shipment to the project. All gauges shall have graduations no larger than 0.7 MPa (100 psi). All calibration certificates and graphs shall be available on site at all times.

Once on the project, the jack is required to be recalibrated (provided the gauges have been confirmed to be accurate) only if:

1. The results of anchor stressing are suspect or inconsistent
2. The jack has been internally machined or the seals replaced
3. The jack has been damaged

The reference gauge shall be kept on site to check the production gauge at a frequency of one test per day or when the accuracy of the production gauge becomes suspect. The production and/or reference gauge shall be recalibrated if:

1. The results of anchor stressing are suspect or inconsistent
2. The difference between the two gauges exceeds their original difference by more than 2 percent of the gauge pressure
3. The gauge has been damaged

If the gauges require recalibration, the performance of the anchors stressed since the previous gauge check, shall be reevaluated to determine that they, in fact, satisfy project requirements.

The use of load cells is recommended only to monitor small changes in load during extended creep testing and long term monitoring.

A production gauge is the gauge that is routinely used during stressing and testing. A reference gauge is a back-up gauge to be used in the field to check the accuracy of the production gauges. A master gauge is the off-site master gauge calibrated every 6 months against a dead weight tester, whose calibration is traceable to the National Institute of Standards and Technology (NIST).

Usually, recalibration of the entire system, jack and gauges, is not required, unless maintenance work on the jack has changed its piston area or internal friction.

Hydraulic pumps do not require calibration.

Gauges shall be used which permit the measurement of total anchor movement at every load increment to be read to the nearest 0.03 mm (0.001 in.). The gauge shall have sufficient travel to measure the total anchor movement at Test Load and the need to reset at an interim point.

Gauges do not require calibration; however, they shall be periodically checked to ensure that the gauge is free to move over its entire measuring range.

### Equipment Setup

When setting up stressing equipment, the sequence of stressing and the procedure to be used for each stressing operation shall be determined at the planning stage of the project. The equipment shall be used in accordance with the manufacturer's operating instructions.

Stressing shall not begin before the grout has attained adequate strength.

Before setting the dial gauges, the Alignment Load (AL) shall be accurately placed on the tendon. The magnitude of AL depends on the type and length of the tendon.

Dial gauges shall bear against a plate fixed to the tendon or on the pulling head. Their lines of sight shall be parallel with the tendon direction.

Dial gauges shall be supported on an independent, reference frame, such as a tripod, which shall not move as a result of stressing or other construction activities during the operation.

Dial gauges with travels greater than 100 mm (4 in.) are especially susceptible to field damage. An alternative is to use two or more gauges of shorter travel in tandem. These are then reset at interim points in the stressing sequence. Considerable care is needed in the subsequent calculation of anchor movement based on such data.

### C8.2.2 Equipment Setup

Anchor stressing and testing can normally start five days after grouting with Type I or II cements, and after three days using Type III cements (see Section 4.11.1 and Figure 7.3).

The Alignment Load typically varies from 5 to 25 % of the Design Load (*DL*), and 10 % is common. The Alignment Load is applied to secure all the components during stressing and to ensure that the residual movements are accurately and consistently determined when unloading during a Performance Test. On strand tendons with a large number of strands, the alignment load is preferably applied with a mono-strand jack to a more equal loading of the individual strands.

The seating loss of the pull wedges must be considered in addition to the reading taken from the dial gauges when analyzing the extension data.

Where such a setup cannot be used, the dial gauges may be supported on the body of the jack, but they will then record only jack ram extension. Particular judgment must be exercised in the interpretation of such data since ram extension may include reaction movement of the structure being anchored, and possibly other movements too. In such cases, ram extension will be an over estimation of the true total anchor movement. Without an independent reference frame, it is not possible to accurately measure creep.

Pull rods for bar tendons shall be properly sized for the prestressing steel and any coating on it, shall be designed to carry the ultimate load of the bar, and must be completely engaged on the bar end.

During stressing, proper safety precautions are essential. Operators and observers must stand to the side of the stressing equipment and never pass behind when it is applying load.

### 8.3 Testing

No pre-loading, other than the alignment load, of the tendon is allowed prior to testing.

No tendon shall be stressed at any time beyond 80% of the specified minimum tendon strength,  $F_{pu}$ .

The three classes of tests are:

- a) Preproduction Tests
- b) Performance Tests
- c) Proof Tests

Every anchor shall be tested in accordance with the Proof or Performance Test procedures. If the anchor is installed in ground that may be susceptible to appreciable creep, then the Performance Test procedures shall be extended in accordance with Section 8.3.4.

#### 8.3.1 Preproduction Tests

Such tests shall be based, as a minimum, on the principles of the Performance Test, but may be more rigorous in detail. They will feature bond zone geometries likely to cause grout-ground failure within the safe operating limits of the other interfaces (e.g. grout-steel) or components (e.g. tendon to 80 percent of  $F_{pu}$ ).

#### 8.3.2 Performance Tests

Performance Tests are conducted on selected production anchors constructed under methods and conditions identical to those foreseen for the overall project.

Serious injury may occur if a tendon fails during stressing.

### C8.3 Testing

Real time assessment of test data is recommended to verify realistic data are being obtained.

When verifying individual anchor performance, anchors may be tested simultaneously, only when a) they are sufficiently far apart that no structural or geological interference may occur and b) there is sufficient special equipment instrumentation and supervision in place that the data recorded from each anchor will be of equal and acceptable quality. Unless the anchor spacing in the bond zone is less than 1.2 m (4 ft), testing of groups of anchors simultaneously to investigate possible anchor interaction may be feasible but is rarely conducted for practical reasons.

The Engineer may specify a test load higher than 1.33 DL. Such an increase in the maximum test load above 133% of the Design Load may require an increased tendon steel area and hole diameter.

#### C8.3.1 Preproduction Tests

Due to cost and time considerations, such tests are specified only in extraordinary circumstances. The number of tests will vary based on the size of the project and the number of anchors to be installed. Typically one to three tests may be performed in each significantly different ground condition. Such special tests may be undertaken to demonstrate or investigate, in advance of the production anchors, the quality and adequacy of the design, the materials and the construction.

#### C8.3.2 Performance Tests



sis of the elastic movement permits calculation of the apparent free tendon length, at each maximum from the relationship:

$$\text{apparent free tendon length} = \frac{A_t E_s \delta_e}{P}$$

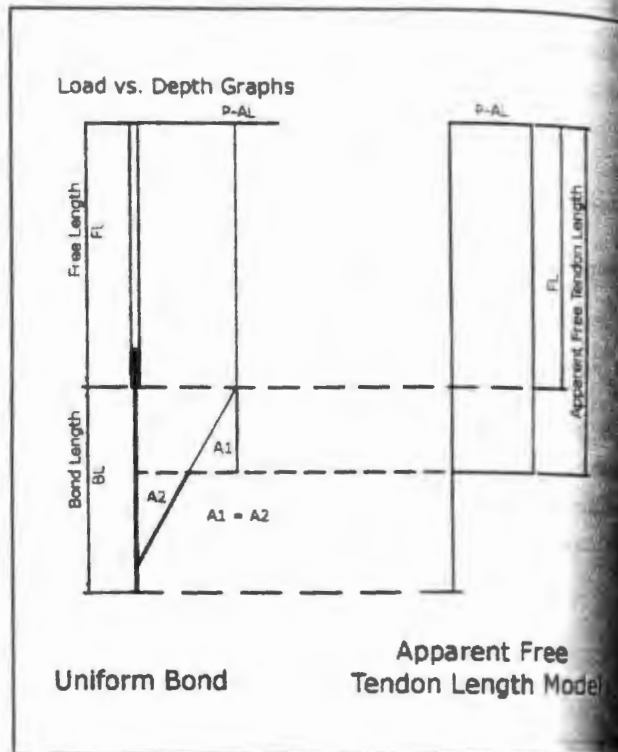
= Cross section of the tendon

= Modulus of elasticity for the prestressing steel

= Elastic movement (i.e., total anchor movement minus subsequent residual movement of  $AL$ )

=  $TL - AL$

**Figure 8.2 Apparent Free Tendon Length**



Apparent free tendon length is the equivalent length of the tendon that with the full load minus alignment loss over its length would elongate the same amount as measured in the test. In Figure 8.2, the area under the load versus depth diagram divided by  $A_t \cdot E_s$  is equal to the elastic movement of the anchor. The apparent free tendon length assumes a uniform rectangular load versus depth diagram. However, load is transferred above and below the bottom of the apparent free tendon length. Assuming uniform bond stress, one half of the load is transferred below this apparent free length and one half above. Given its simplicity, the apparent free tendon length is a very useful indicator of load transfer distance along the bond length.

The actual  $E$  modulus of a long multi strand tendon may be less than the manufacturer's  $E$  value for a single strand measured over a relatively short gauge length. A reduction in the manufacturer's  $E$  modulus value of 3 to 5% is allowed in any field diagnosis.

### 3.3 Proof Tests

Proof Tests shall be carried out on all production anchors not subjected to a Performance Test.

#### C8.3.3 Proof Tests

This test is intended to quickly and economically determine:

- a) Whether the anchor has sufficient load carrying capacity,
- b) That the apparent free tendon length has been satisfactorily established, and
- c) That the rate of creep stabilizes within the specified limits.

The Proof Test shall be conducted by incrementally loading the anchor in accordance with the schedule in Table 8.2. At the Test Load, the load shall be maintained constant for 10 minutes and total movement readings shall then be recorded at 1, 2, 3, 4, 5, 6 and 10 minutes after reaching the Test Load. If the total creep movement between 1 and 10 minutes exceeds 1 mm (0.040 in.), the Test Load then shall be maintained for an additional 50 minutes and the movement readings shall be recorded at 20, 30, 40, 50 and 60 minutes.

During the load hold periods, the anchor load shall not be allowed to deviate from the test pressure by more than 0.35 MPa (50 psi). Re-pumping back to Test Load will compensate for small movements, hydraulic oil seepage and changes in temperature of the hydraulic oil. The load shall always be returned to the specified Test Load prior to taking the movement reading at the specified interval. The Test Load shall not be exceeded during the period of observation.

The test data shall be plotted and analyzed as shown in Figures 8.3a and 8.3b. For approximating the elastic elongation of Proof Tested anchors, the value for the residual movement of adjacent representative Performance Tested anchors shall be deducted from the total movement measured. When the results of Performance Tests cannot be compared directly to those of Proof Tests, the anchor should be returned to *AL* after the 10-minute hold at Test Load and raised again to Lock-Off. This will permit the determination of residual movement, and so calculation of the elastic movement at the Test Load.

**Table 8.2** Proof Test Steps

<i>AL</i>
0.25 <i>DL</i>
0.50 <i>DL</i>
0.75 <i>DL</i>
1.00 <i>DL</i>
1.20 <i>DL</i>
1.33 <i>DL</i> [Test Load] (10 minute hold)
<i>AL</i> (Optional)
Adjust to Lock-Off Load

A comparison of the total movement graphs of the Proof Test with those of the Performance Tests (conducted in similar conditions) may allow additional insight into the load transfer characteristics of the Proof Tested anchors. The Test Load should be reached as quickly as possible.

For temporary anchors where ground conditions, loading conditions, and installation procedures are sufficiently understood, and installation procedures are well controlled: Proof Test maximum loads as low as 1.20 *DL* may be appropriate. However, regardless of how low the Proof Test maximum is, the Design Load may not exceed 0.6  $F_{pu}$ .



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## ANCHOR BOLT- PULL TEST

**CLIENT:** Hirani Construction Management Inc.  
30 Jericho Executive Plaza, Suite 200C  
Jerico, NY 11753

**DATE:** 02-22-2012

**FILE NO:** ANS-3041

**REPORT NO:** 1

**PROJECT:** Dywidag Soil/Rock Anchor Proof Testing  
Yonkers Avenue, Village of Tuckhoe  
USACE-Project # 153725  
Dny#SB 402, RFI-14 Amendment on Drawing  
SB402 and Hirani Shop Drawing S-003.33  
dated 01/18/2012

**ENGINEERS:** Shailesh Trivedi  
B K Shah  
Surge

**TIME:** 7.00 to 10.00 am

### ----- CERTIFICATE OF INSPECTION -----

As per your request, our inspectors visited the site to perform Anchor bolt Pull tests at the above referenced project site on 02-22-2012

**LOCATION OF TEST AREA:** Rock Stabilized Anchor # 1

#### **Observations/Remarks:**

- (1) Bolts were Pull tested utilizing 100 ton Capacity, Enerpac Central hole hydraulic jack Model RCH-1003 With Enerpac manually operated (hand) pump Model SCH-1003H (P-80) and Dial Gauge Model GP-10S
- (2) Test load of 50.5 T ( 101 kips) was applied in two increment of 25 T & 25.5 T
- (3) Applied load was sustained for 5 min & displacement of anchor bar was recorded.
- (3) The following table shows the test result & remarks.

Test No.	Load Increment	Pressure Gauge Reading PSI	Test Load ( T )	Displacement Dial Reading Inches	Net Displacement Inches	Remarks
1	-	0	0	0	-	
	1st	2500	25	0.052	-	
	2nd	5050	50.5	0.125	0.073	Pass



Picture 1



Picture 2





Picture 3



Picture 4



# CREAMER ENVIRONMENTAL, INC.

CONTRACTORS & CONSULTANTS

12 Old Bridge Road, Cedar Grove, NJ 07009

201-968-3300 Fax (201) 968-3301

## LETTER OF TRANSMITTAL

Environ International Corporation

20 Custom House Street

Boston, MA 02110

DATE: 4/14/16

JOB NO.: 16-0463

ATTENTION: Nicholas Steenhaut

RE: Metal Bank NPL Site

WE ARE SENDING YOU

- ☐ Shop Drawings  
☐ Copy of letter



Attached



Prints



Change order



Under separate cover via \_\_\_\_\_ the following items:



Plans



Samples



Specifications



\_\_\_\_\_

COPIES	DATE	PAGES	DESCRIPTION
1	4/14/2016	10	Submittal #13.2 Tie-Rod Testing Program

THESE ARE TRANSMITTED as checked below:

☒ For Acceptance

☐ Approved as submitted

☐ Resubmit \_\_\_\_\_ copies for approval

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☐ Review & comment



REMARKS

\_\_\_\_\_

\_\_\_\_\_

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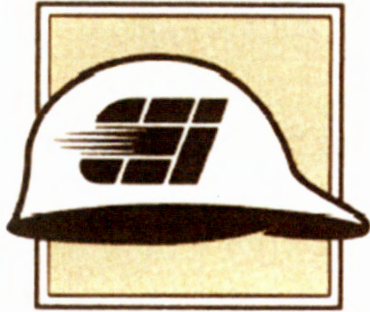
COPY TO:

SIGNED:

*Meghan Murphy*

Meghan Murphy  
Project Coordinator





# CREAMER ENVIRONMENTAL, INC.

REMEDIATION CONTRACTORS

12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009

(201) 968-3300 • FAX (201) 968-3301

## **Metal Bank NPL Site Philadelphia, PA Tie-Rod Testing Program**

Creamer Environmental, Inc. (CEI) will proof-test 10 tie-rod anchors as identified on the attached plan following the placement of the stabilization berm and waler repair. The tie-rod testing will be performed by Union dock builders from Local 454 and ANS Consultants, Inc. (ANS). ANS' qualifications have been provided under separate cover. In addition, RA Consultants LLC (RAC) or a designated representative will be onsite to observe the tie-rod proof tests and record the movement readings.

Work will be performed off of the stone berm and/or mats as required. The testing will require an extension piece of Dywidag Threadbar #11 in Zone 1 and #18 in Zones 2 and 3 as applicable to be added on the existing tie-rods with a coupler such that the jack can stress the tie-rod and it can be locked off at the correct load. In some locations there is not enough length on the existing tie-rod past the nut to add a coupler and extension piece for tensioning therefore CEI will have to cut the existing rod by mechanical means utilizing a demolition saw to back to behind the nut. CEI will cut each tie-rod one at a time as work is being performed and will not cut all of the tie-rods simultaneously. Once the tie-rod is cut, CEI will attach an epoxy coated coupler and epoxy coated piece of rod to extend the length of the tie-rod for jacking. These materials will then be left in place and a new epoxy coated nut will be installed to lock the tie-rod off at the correct load. The following table will be completed with as-built information:

<b>Tie-Rod ID</b>	<b>T-2</b>	<b>T-5</b>	<b>T-14</b>	<b>T-22</b>	<b>T-23</b>	<b>T-24</b>	<b>T-25</b>	<b>T-26</b>	<b>T-28</b>	<b>T-39</b>
Tie-Rod Size										
Temporary or Permanent Extension										
Length Removed										
Length added with Coupler										
Lock-Off Load										

The dock builders will secure the jack in place on the tie-rod at each test location so that proof testing can be performed by ANS. In the area of the waler repair the 5' work platform will be utilized, in other areas a wooden platform on top of sand bags to level it along the sloped berm will be installed. The dial gauge will be clamped onto a pipe mounted in a 5-gallon bucket with concrete in order to provide a stable, unmoving base for the testing equipment.

The equipment to be provided by ANS is as follows, cut sheets for the pull test equipment are attached:

1. Enerpac Center Hole Jack Model RCH-1003
2. Enerpac Hand Pump Model P-80
3. Enerpac Dial Gauge Model GP-10S

Prior to proof-testing, CEI will provide a calibration certificate for the jack that will be used.

The proof test will be conducted as per the Monitoring section on Contract Figure 1 by incrementally loading each identified anchor in accordance with the following steps:

<b>Tie-Rod ID</b>	<b>T-2</b>	<b>T-5</b>	<b>T-14</b>	<b>T-22</b>	<b>T-23</b>	<b>T-24</b>	<b>T-25</b>	<b>T-26</b>	<b>T-28</b>	<b>T-39</b>
Design Load (DL*)	75	70	50	50	70	70	70	50	50	50
Alignment Load (0.1xDL)	7.5	7	5	5	7	7	7	5	5	5
0.25xDL	18.75	17.5	12.5	12.5	17.5	17.5	17.5	12.5	12.5	12.5
0.50xDL	37.5	35	25	25	35	35	35	25	25	25
0.75xDL	56.25	52.5	37.5	37.5	52.5	52.5	52.5	37.5	37.5	37.5
1.00xDL	75	70	50	50	70	70	70	50	50	50
1.20xDL	90	84	60	60	84	84	84	60	60	60
Test Load 10-Min. Hold (1.33xDL)	99.75	93.1	66.5	66.5	93.1	93.2	93.2	66.5	66.5	66.5

\*All measurements are in KIPS.

Total movement readings will be recorded after reaching each loading increment. At the designated test load, the load will be held constant for 10 minutes. During the load hold period, ANS will record tie-rod elongation. The anchor load will not be allowed to deviate from the pressure by more than 50psi. Total movement readings during the hold be recorded at 1, 2, 3, 4, 5, 6 and 10-minutes after reaching the test load.

As per the monitoring specifications, if the test step loads cannot be maintained, the tie-rod has failed and RAC may determine additional testing and repair work may be necessary. If the total creep movement between 1 and 10-minutes is less than .04", the test is complete and the tie-rod will be adjusted to lock-off load which is equivalent to the design load unless otherwise directed by RAC. If the total creep movement between 1 and 10-minutes exceeds .04", the test load will be maintained for an additional 50 minutes. The total movement readings will then be recorded at 20, 30, 40, 50 and 60-minutes. If the

creep movement between 10 and 60-minutes is less than .04", or the total creep movement is less than .08", the test is complete and the tie-rod will be adjusted to lock-off load. If the 10-minute creep movement exceeds .04" and the 60-minute creep movement exceeds .08", RAC may determine additional testing and repair work may be necessary.

At the end of the proof testing ANS will provide signed and sealed Certificates of Inspection.



## Rev. 1 April 14, 2016

 ALTERNATE TIE-ROD TEST LOCATION

— WORK AND STAGING ZONE —

A-A  
FIG 4

FIG. 3

 $300^{\circ}-9^{\circ}\pm$ 

1 ) STABILIZING BERM PLAN  
Scale: 1/16" = 1'-0"

[illegible]

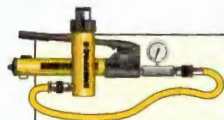
# RCH-Series, Hollow Plunger Cylinders

**ENERPAC**  
POWERFUL SOLUTIONS. GLOBAL FORCE.

from left to right: RCH-306, RCH-120, RCH-1003



## Versatility in Testing, Maintenance and Tensioning Applications



### Cylinder-Pump Sets

All cylinders marked with an \* are available as **sets** (cylinder, gauge, couplers, hose and pump) for your ordering convenience.

Page: 58



### Ultra-Lightweight Aluminium Cylinders

If you need a higher cylinder capacity-to-weight-ratio the lightweight **RACH-Series** are the perfect choice.

Page: 16



### Saddles

Most RCH-Series cylinders are equipped with smooth saddles. See table at next page for optional threaded saddles and all dimensional information.

Page: 27

Hollow plunger design allows for both, pull and push forces

Single-acting, spring return

Nickel-plated, floating center tube on models over 20 ton increases product life

Baked enamel finish for increased corrosion resistance

Collar threads for easy fixturing

RCH-120 includes AR-630 coupler and has 1/4" NPTF port

RCH-121 and RCH-1211 have FZ-1630 reducer and AR-630 coupler, all other models feature CR-400 coupler.

Hollow plunger cylinder RCH-1003 used in an application for intermediate boom suspension on a dragline.



Cylinder Capacity	Stroke	Model Number	Cylinder Effective Area	Oil Capacity
ton (kN)	(mm)		(cm <sup>2</sup> )	(cm <sup>3</sup> )
13 (125)	8	<b>RCH-120</b>	17,9	14
	42	<b>RCH-121*</b>	17,9	75
	42	<b>RCH-1211</b>	17,9	75
	76	<b>RCH-123</b>	17,9	136
20 (215)	49	<b>RCH-202*</b>	30,7	150
	155	<b>RCH-206</b>	30,7	476
30 (326)	64	<b>RCH-302*</b>	46,6	298
	155	<b>RCH-306</b>	46,6	722
60 (576)	76	<b>RCH-603*</b>	82,3	626
	153	<b>RCH-606</b>	82,3	1259
95 (931)	76	<b>RCH-1003*</b>	133,0	1011

Available as set, see note on this page.



# Single-Acting, Hollow Plunger Cylinders



## Hoses

Enerpac offers a complete line of high quality hydraulic hoses. To ensure the integrity of your system, specify only Enerpac hydraulic hoses.

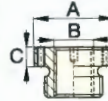
Page: 116

## RCH Series



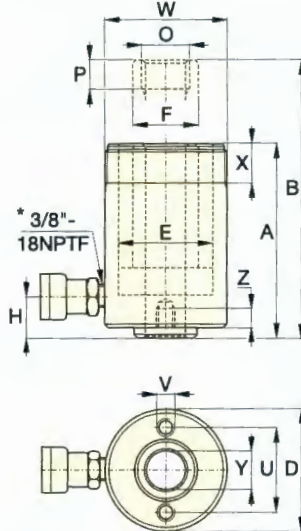
### Optional Heat Treated Hollow Saddles

Saddle Type	Cylinder Model Number	Saddle Model Nr.	Saddle Dimensions (mm)		
			A	B	C
Threaded Hollow	RCH-202, 206	HP-2015	53	1" - 8	9
	RCH-302, 306	HP-3015	63	1 1/4" - 7	9
	RCH-603, 606	HP-5016	91	1 5/8" - 5 1/2	12
	RCH-1003	HP-10016	126	2 1/2" - 8	13



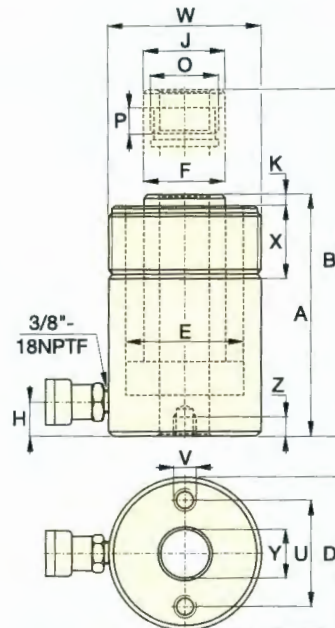
Smooth hollow saddles are standard on all RCH-models (except RCH-120, RCH-1211).

RCH-121 and RCH-1211 have a 47 mm dia. boss that protrudes 6 mm from base.



RCH-120 to RCH-123 models

\* 1/4" NPTF for RCH-120 only



RCH-202 to RCH-1003 models

Capacity:

**13-95 ton**

Stroke:

**8-155 mm**

Center Hole Diameter:

**19,6-79,0 mm**

Maximum Operating Pressure:

**700 bar**

### Base Mounting Hole Dimensions (mm)

Model Number	Bolt Circle U	Thread V	Thread Depth Z
RCH-120	50,8	5/16" - 18 UNC	9,0
RCH-121	-	-	-
RCH-1211	-	-	-
RCH-123	50,8	5/16" - 18 UNC	12,7
RCH-202	82,6	3/8" - 16 UNC	9,4
RCH-206	82,6	3/8" - 16 UNC	9,4
RCH-302	92,2	3/8" - 16 UNC	14,0
RCH-306	92,2	3/8" - 16 UNC	14,0
RCH-603	130,3	1/2" - 13 UNC	14,0
RCH-606	130,3	1/2" - 13 UNC	14,0
RCH-1003	177,8	5/8" - 11 UNC	19,0

Coll. Height A (mm)	Ext. Height B (mm)	Outside Dia. D (mm)	Cyl. Bore Dia. E (mm)	Plgr. Dia. F (mm)	Cyl. Base to Advance Port H (mm)	Saddle Dia. J (mm)	Saddle Protrusion from Plgr. K (mm)	Plunger Internal Thread O	Plunger Thread Length P (mm)	Collar Thread W	Collar Thread Length X (mm)	Center Hole Dia. Y (mm)	(kg)	Model Number
55	63	69	54,1	35,1	9	-	-	3/4" - 16 UN	16	2 3/4" - 16	30	19,6	1,5	RCH-120
120	162	69	54,1	35,1	25	-	-	-	-	2 3/4" - 16	30	19,6	2,8	RCH-121*
120	162	69	54,1	35,1	25	-	-	3/4" - 16 UN	16	2 3/4" - 16	30	19,6	2,8	RCH-1211
184	260	69	54,1	35,1	25	-	-	-	-	2 3/4" - 16	30	19,6	4,4	RCH-123
162	211	98	73,1	54,1	19	54	9,7	1 9/16" - 16 UN	19	3 7/8" - 12	38	26,9	7,7	RCH-202*
306	461	98	73,1	54,1	25	54	9,7	1 9/16" - 16 UN	19	3 7/8" - 12	38	26,9	14,1	RCH-206
178	242	114	88,9	63,5	21	63	9,0	1 13/16" - 16 UN	22	4 1/2" - 12	42	33,3	10,9	RCH-302*
330	485	114	88,9	63,5	25	63	9,0	1 13/16" - 16 UN	22	4 1/2" - 12	42	33,3	21,8	RCH-306
247	323	159	123,9	91,9	31	91	12,0	2 3/4" - 16 UN	19	6 1/4" - 12	48	53,8	28,1	RCH-603*
323	476	159	123,9	91,9	31	91	12,0	2 3/4" - 16 UN	19	6 1/4" - 12	48	53,8	35,4	RCH-606
254	330	212	165,1	127,0	38	126	12,0	4" - 16 UN	25	8 3/8" - 12	60	79,0	63,0	RCH-1003*



# -Series, Cylinder-Pump Sets

**ENERPAC**   
POWERFUL SOLUTIONS. GLOBAL FORCE.

in cylinder-pump set: SCR-1010H



## The Quickest and Easiest Way to Start Working Right Away



### LW-16 Lifting Wedge

Hydraulic cylinders, jacks and lifting wedges can also be used to assist in positioning and aligning.

The LW-16 only requires an access gap of 10 mm. See our "Specialty Tools" section on [www.enerpac.com](http://www.enerpac.com).

Optimum match of individual components

Our sets are ready-for-use and include single-acting cylinder, hand-operated pump, 1,8 m safety hose and gauge and adaptor

RC-Series DUO, General Purpose Cylinders: for maximum versatility

RC-Series, Low Height Cylinders: ideal where space is restricted

RCH-Series, Hollow Plunger Cylinders: for pushing and pulling applications.

 Cylinder Selection	Cylinder Capacity (ton (kN))	Cylinder Model Number	Cylinder Stroke (mm)	Collapsed Height (mm)
	5 (45)	RC-55	127	215
	10 (101)	RC-102	54	121
		RC-106	156	247
		RC-1010	257	349
	15 (142)	RC-154	101	200
		RC-156	152	271
	25 (232)	RC-252	50	165
		RC-254	102	215
		RC-256	158	273
		RC-2514	362	476
	50 (498)	RC-506	159	282
	10 (101)	RCS-101	38	88
	20 (201)	RCS-201	45	98
	30 (295)	RCS-302	62	117
	45 (435)	RCS-502	60	122
	90 (887)	RCS-1002	57	141
	13 (125)	RCH-121	42	120
	20 (215)	RCH-202	49	162
	30 (326)	RCH-302	64	178
	60 (576)	RCH-603	76	247
	95 (933)	RCH-1003	76	254

Cylinder-Pump Sets – optimum match of components. The quickest and easiest way to start working right away.



# Single-Acting Cylinder-Pump Sets

## SET SELECTION:

- 1** Select the cylinder
- 2** Select the pump
- 3** Find the set model number in the matrix.

## SELECTION EXAMPLE

### Selected cylinder:

- RC-106, Single-Acting General Purpose Cylinder with 156 mm stroke

### Selected pump:

- P-392, Lightweight hand pump

### Set model number:

- SCR-106H

### Included:

- HC-7206 hose
- GF-10B gauge
- GA-2 adaptor

## SC Series



Capacity:

**5 - 95 ton**

Stroke:

**38 - 362 mm**

Maximum Operating Pressure:

**700 bar**

## 2 Pump selection (See enerpac.com for full product descriptions)

## Accessories included

Hand Pump P-142	Hand Pump P-392	Hand Pump P-80	Foot Pump P-392FP	XA-Series Air Pump XA-11	Hose Model Number	Gauge Model Number	Gauge Adaptor Model Nr.
							
<b>3</b> SCR-55H	-	-	-	-	HC-7206	GP-10S	GA-4
-	SCR-102H	-	SCR-102FP	SCR-102XA	HC-7206	GF-10B	GA-2
-	SCR-106H	-	SCR-106FP	SCR-106XA	HC-7206	GF-10B	GA-2
-	SCR-1010H	-	SCR-1010FP	SCR-1010XA	HC-7206	GF-10B	GA-2
-	SCR-154H	-	SCR-154FP	SCR-154XA	HC-7206	GP-10S	GA-2
-	SCR-156H	-	SCR-156FP	SCR-156XA	HC-7206	GP-10S	GA-2
-	SCR-252H	-	SCR-252FP	SCR-252XA	HC-7206	GF-20B	GA-2
-	SCR-254H	-	SCR-254FP	SCR-254XA	HC-7206	GF-20B	GA-2
-	SCR-256H	-	-	SCR-256XA	HC-7206	GF-20B	GA-2
-	-	SCR-2514H	-	SCR-2514XA <sup>1)</sup>	HC-7206	GF-20B	GA-2
-	-	SCR-506H	-	SCR-506XA <sup>1)</sup>	HC-7206	GF-50B	GA-2
-	SCL-101H	-	SCL-101FP	SCL-101XA	HC-7206	GF-10B	GA-2
-	SCL-201H	-	SCL-201FP	SCL-201XA	HC-7206	GF-230B	GA-2
-	SCL-302H	-	SCL-302FP	SCL-302XA	HC-7206	GF-230B	GA-2
-	SCL-502H	-	SCL-502FP	SCL-502XA	HC-7206	GF-510B	GA-2
-	-	SCL-1002H	-	-	HC-7206	GF-510B	GA-2
SCH-121H	-	-	-	-	HB-7206	GF-120B	GA-4
-	SCH-202H	-	SCH-202FP	SCH-202XA	HC-7206	GF-813B	GA-3
-	SCH-302H	-	SCH-302FP	SCH-302XA	HC-7206	GF-813B	GA-3
-	-	SCH-603H	-	SCH-603XA <sup>1)</sup>	HC-7206	GF-813B	GA-3
-	-	SCH-1003H	-	-	HC-7206	GP-10S	GA-2

<sup>1)</sup> With XA-12 air pump.



# Hydraulic Force & Pressure Gauges

**ENERPAC**  
POWERFUL SOLUTIONS. GLOBAL FORCE.

Shown from left to right: GF-230B, GF-835B, GP-10S



**F-series gauges:** calibrated with dual scale reading for pressure and force in bar and kN

**F-series gauges:** all pressure sensing parts are sealed and dampened by glycerine for long life

**P-series gauges:** calibrated with dual scale reading for pressure in bar and psi

**Excellent readability:** gauge face dimensions 100 mm

**Fast, easy installation**

**Stainless steel gauge cases for corrosion resistance.**

*GP-10S gauge is used on this press to check the hydraulic pressure required to bend flat steel bar.*



## Visual Reference for System Pressure and Force



### Auto-Damper Valve V-10

For automatic control of gauge fluctuations, the V-10 Auto-Damper Valve controls the movement of the gauge needle by restricting oil flow in and out of the gauge. No adjustments needed.

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### Snubber Valve V-91

Infinitely adjustable for metering oil out of a gauge. The V-91 Snubber Valve is also suitable as a shut-off valve to protect the gauge during high cycle applications.

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### Used With

- All Cylinders
- All Cylinders
- All 5 ton Cylinders
- All 10 ton Cylinders
- All 25 ton RC-Cylinders
- All 50 ton RC, RR-Cylinders
- 13 ton RCH-Series
- RCS-201, 302
- RCS-502, 1002
- RCH-202, 302, 603
- All 25, 30, 50 ton cylinders
- All 75, 100 ton cylinders
- All 150, 200 ton cylinders
- 10 ton VLP Presses
- 25 ton XLP Presses
- 50 ton XLP, BPR Presses
- 100 ton VLP, BPR Presses
- 200 ton VLP, BPR Presses





# Hydraulic Force & Pressure Gauges



## Maximum Indicator Pointer

Indicator retains peak readings of pressure or force generated by the system.

Can easily be installed on GP and H-Series gauges.  
Order model nr: **BSA-881**.



## Pressure Gauges

To measure the input pressure into cylinders or high pressure systems. Also for all testing applications.

## Force Gauges

To measure external load supported by a cylinder or jack in kN. For pressing parts together under pre-determined loads, weighing, testing, etc.

**GP-Series** are dry gauges.  
**GF-Series** are glycerine filled gauges.

## GF GP Series



Pressure Range:

**0 - 1000 bar**

Force Range:

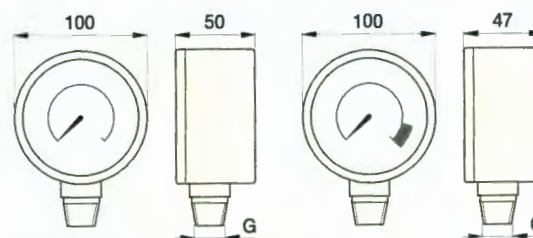
**0 - 2000 kN**

Gauge Face Diameter:

**100 mm**




Accuracy, % of full scale:

**± 1%**



GP-series

GF-series

Gauge Type and Calibration				Units per Division	Model Number *	Thread G	Gauge Adaptor		
									
							Required		
bar	psi	bar	kN				GA-1	GA-2	GA-3
0-700	0-10.000	—	—	10 bar, 100 psi	GP-10S	½" NPTF	●	●	
0-1000	0-15.000	—	—	10 bar, 200 psi	GP-15S	½" NPTF	●	●	
—	—	0-700	0-45	10 bar, 0,5 kN	GF-5B	½" NPTF	●	●	
—	—	0-700	0-100	10 bar, 1 kN	GF-10B	½" NPTF	●	●	
—	—	0-700	0-232	10 bar, 2 kN	GF-20B	½" NPTF	●	●	
—	—	0-700	0-500	10 bar, 5 kN	GF-50B	½" NPTF	●	●	
—	—	0-700	0-124	10 bar, 1 kN	GF-120B	½" NPTF	●	●	
—	—	0-700	0-175/275	10 bar, 2 + 5 kN	GF-230B	½" NPTF	●	●	
—	—	0-700	0-450/900	10 bar, 5 + 10 kN	GF-510B	½" NPTF	●	●	
—	—	0-700	0-210/320/570	10 bar, 5 kN	GF-813B	¼" NPTF			●
—	—	0-700	0-232/300/500	10 bar, 5 kN	GF-835B	¼" NPTF			●
—	—	0-700	0-720/930	10 bar, 10 kN	GF-871B	¼" NPTF			●
—	—	0-700	0-1400/2000	10 bar, 25 kN	GF-200B	¼" NPTF			●
—	—	0-700	0-100	10 bar, 1 kN	GF-10B	½" NPTF	●	●	
—	—	0-700	0-232	10 bar, 2 kN	GF-20B	½" NPTF	●	●	
—	—	0-700	0-500	10 bar, 5 kN	GF-50B	½" NPTF	●	●	
—	—	0-700	0-720/930	10 bar, 10 kN	GF-871B	¼" NPTF			●
—	—	0-700	0-1400/2000	10 bar, 25 kN	GF-200B	¼" NPTF			●

\* GF-Series Force gauges with imperial scale reading (psi, lbs) are available by changing the suffix 'B' into 'P'.

